

## **POES IJPS**

# **Polar-orbiting Operational Environmental Satellite (POES)**

## **POES System Requirements for Initial Joint Polar-orbiting Operational Satellite System**

**June 2002**



**Prepared by:**

**U.S. Department of Commerce  
National Oceanic and Atmospheric Administration (NOAA)  
National Environmental Satellite, Data, and Information Service (NESDIS)**

**NOAA/NESDIS**

**Polar-orbiting Operational Environmental Satellite  
(POES)  
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## **Preface**

This document comprises the NOAA/NESDIS baseline publication of the Polar-orbiting Operational Environmental Satellite (POES) System Requirements for Initial Joint Polar-orbiting Operational Satellite System (IJPS). This document is Revision 0, DCN 0 (document number NOAA-IJPS/OSD-2002-0012R0UD0).

This document identifies the IJPS requirements that are applicable to the POES system and its overall functionality, performance, design and operations to support the IJPS. The requirements stated in this document provide the basis for the allocation of requirements to POES system, segments, segment elements and to system interfaces. The intent is to provide a baseline for upgrades needed to support Metop satellite related functions required to sustain the joint NOAA/EUMETSAT IJPS system. Unless specifically cited in this document, the POES system operating with the NOAA-N and NOAA-N' satellites in the IJPS time period will continue to meet the baseline performance and quality requirements for the POES system.

Publication of this document closes Document Configuration Change Request (DocCCR) # DocCCR-POES-Other-2002-002, entitled Acceptance of POES System Requirements for Initial Joint Polar-orbiting Operational Satellite System (IJPS).

Future updates and revisions to this document will be produced and controlled by NOAA/NESDIS/OSD.



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## Acronyms

AAS	Archive & Access System
AD	Applicable Document
A-DCS	Advanced DCS
AFSCN	Air Force Satellite Control Network
AFSCN	Air Force Space Communications Network
AMSU-A	Advanced Microwave Sounding Unit-A
ARGOS	Advanced Data Collection and Location System
ASCAT	Advanced Scatterometer
ATN	Advanced TIROS-N
AVHRR	Advanced Very High Resolution Radiometer
CCSDS	Consultative Communications Committee for Space Data Systems
CDA	Command and Data Acquisition
CEMSCS	Central Environmental Satellite Computer System
CGS	Core Ground Segment (EUMETSAT)
COMM	Communications
DCS	Data Collection and Location System
DOD	Department of Defense
EEIS	EUMETSAT External Information Service
EPS	EUMETSAT Polar System
ESA	European Space Agency
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
GAC	Global Area Coverage (NOAA global data)
GDS	Global Data Stream (Metop global data)
GFT	Generic File Transfer
GOME	Global Ozone Monitoring Experiment
GPS	Global Positioning System
GRAS	Global navigation satellite system Receiver for Atmospheric Sounding
HIRS	High-Resolution Infrared Sounder
HRPT	High Resolution Picture Transmission



IASI	Infrared Atmospheric Sounding Interferometer
ICD	Interface Control Document
ID	Identifier
IJPS	Initial Joint Polar-orbiting Operational Satellite System
IPD	Information Processing Division
IPO	Integrated Program Office
IPS	Information/Data Processing
IR	Infrared
IRD	Interface Requirement Document
JORP	Joint Operations, Rules, and Procedures
LEO	Launch & Early Orbit
LRPT	Low Resolution Picture Transmission
LST	Local Solar Time
Metop	Meteorological Operational Satellite
MHRPT	Direct broadcast Metop High Resolution Picture Transmission
MHS	Microwave Humidity Sounder
MOA	Memorandum of Agreement
NASA	National Aeronautics and Space Administration
NCDC	National Climatic Data Center
NESDIS	National Environmental Satellite, Data and Information Service
NOAA	National Oceanic and Atmospheric Administration
NODC	National Oceanographic Data Center
NWS	National Weather Service
ORA	Office of Research and Applications
OSD	Office of Systems Development
OSDPD	Office of Satellite Data Processing and Distribution
OSO	Office of Satellite Operations
PCDAS	EUMETSAT Polar Command and Data Acquisition Station
PGD	Product generation & Distribution Systems
PGDS	Product Generation & Distribution Systems

PGS	POES Ground Segment
PIP	Program Implementation Plan
POES	Polar-orbiting Operational Environmental Satellite
RD	Reference Document
RDE	Reference Document EUMETSAT
RDN	Reference Document NOAA
RF	Radio Frequency
RTVM	Requirement Traceability & Verification Matrix
S&R	Search and Rescue
SAA	Satellite Active Archive
SAIP	Stored AIP
SARP	Search and Rescue Processor
SARR	Search and Rescue Repeater
SARSAT	Search and Rescue Satellite
SARSSL	Search and Rescue Satellite-Aided Tracking
SBUV	Solar Backscatter Ultra Violet
SCR	System Commissioning Review
SEM	Space Environment Monitor
SLVS	Satellite Launch Vehicle System
SN	Space Network
SOCC	Spacecraft Operations Control Center
STIP	Stored TIP
TBC	To be confirmed
TBD	To be determined
TBS	To be supplied
TBW	To be written
V&V	Verification & Validation
VCDU	Virtual Channel Data Unit
UTC	Universal Time Constant
OBT	On Board Time



## 1.0 Introduction

The National Oceanic and Atmospheric Administration (NOAA) has entered into an agreement with the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) for participation in the Initial Joint Polar-orbiting Operational Satellite System (IJPS) (hereinafter referred to as the "IJPS Agreement"). In the IJPS Agreement, NOAA and EUMETSAT agree to operate their Polar-orbiting satellites in a manner beneficial to both parties and the world's meteorological community.

The IJPS is comprised of two independent, but fully coordinated, polar satellite systems. Each independent system is comprised of two satellites flown consecutively under control of its respective ground segment. In support of the IJPS, NOAA satellites NOAA-N and -N' will be flown consecutively (N' replaces N) in a polar orbit with an afternoon equatorial crossing time (2 PM, Ascending). EUMETSAT, working together with the European Space Agency (ESA), will develop the Meteorological Operational (Metop) series of satellites to be flown consecutively in a Polar orbit with a mid-morning equatorial crossing time (9.30 AM mean local solar time, Descending). The Metop satellites comprise the space segment of the EUMETSAT Polar System (EPS).

The mid-morning (Metop) and afternoon (NOAA) satellites will have a set of jointly provided common instruments, plus additional instruments specific to each orbit, provided by NOAA and EUMETSAT for their satellites. The IJPS Agreement commits NOAA and EUMETSAT to supporting each other's operational satellites through their respective ground segments for commanding, receiving telemetry and global data, monitoring their respective satellite on-orbit status, and exchanging data between the two polar satellite systems. However, per agreement in the Program Implementation Plan (PIP) for the cooperation between NOAA and EUMETSAT on IJPS, Section 3.6.1.1, states that during nominal operations, each party is only responsible to control its own satellite, including the instruments they carry, regardless of their origin. NOAA and EUMETSAT will however support each other as mutually agreed through a joint operations plan.

NOAA's national and international commitments for providing global environmental data are the responsibility of the National Environmental Satellite, Data, and Information Service (NESDIS). NESDIS is responsible for establishing and operating civil operational environmental satellite systems while acquiring replacement satellites and launch vehicles and launch services through interagency agreements with the National Aeronautics and Space Administration (NASA).

Since the early 1960's, NESDIS (or its predecessor agency the National Environmental Satellite Service) has operated and maintained Polar-orbiting environmental satellites in support of NOAA's mission. Since 1978, NOAA's Polar-orbiting Operational Environmental Satellite (POES) system has operated with a two-satellite constellation in circular, near polar, sun-synchronous orbits. The current system is operating with two fifth-generation advanced TIROS-N (ATN) satellites. NOAA-15 was launched on May 13, 1998 into a morning orbit with a

nominal 0730 local solar time southbound Equator crossing time. NOAA-16 was launched on September 21, 2000 into an afternoon orbit with a nominal 1340 LST northbound Equator crossing time. In the time period for IJPS operations, NESDIS will continue to operate and maintain the POES system as described herein.

## **1.1 Purpose**

The purpose of this document is to establish, within the NESDIS POES documentation system, the IJPS requirements that are applicable to the POES system and its overall functionality, performance, design and operations to support the IJPS. The requirements defined in this document provide the basis for the allocation of requirements to POES system, segments, segment elements and to system interfaces.

The requirements in this document are levied by the POES Program Office on the NOAA/NESDIS organizational entities responsible for system elements, as defined in the NOAA Ground Segment Project Plan for IJPS. Each entity shall incorporate these requirements in to their overall system upgrade implementation activity in accordance with their respective requirement process.

This document also provides the baseline against which the IJPS System and the POES Ground Segment (PGS) will be verified and validated.

## **1.2 Scope**

This document defines requirements to be satisfied by NOAA's POES system for participation in the IJPS with the EUMETSAT.

The NOAA scope of work for IJPS support entails upgrades and modifications of the existing operational NOAA POES Ground Segment. The major ground segment elements affected by IJPS are the Command & Data Acquisition station at Fairbanks, the Satellite Operations Control Center, Data Ingest and Product Processing Centers, Data Archiving Centers, and internal and external communication interfaces. All of these ground segment elements shall maintain their continued support of the heritage POES System with little or no changes.

## **1.3 Document Organization**

- |             |   |
|-------------|---|
| Section 1   | lists the applicable and reference documentation that provide source and input information to the scope of requirements on the POES system. |
| Section 2   | describes the POES mission objectives that will be supported in the IJPS time period and a brief description of the baseline POES system.   |
| Section 3   | provides the formal requirement statements.   |
| Section 4   | describes the verification and validation requirements.   |
| Attachments | include Requirement Traceability and Verification Matrix.   |

## 1.4 Applicable and Reference Documentation

Tables 1-1 presents a list of Applicable Documents (AD-#) that contain information and/or requirements that need to be applied for the successful completion of the IJPS program. In case of conflict between requirements in this document and any listed applicable document, then this document takes precedence as the source for NOAA requirements.

**Table 1-1 Applicable Documents**

Doc #	Title	Reference Number	Issue	Date
AD-1	Agreement Between the United States National Oceanic and Atmospheric Administration and the European Organisation for the Exploitation of Meteorological Satellites on an Initial Joint Polar-orbiting Operational Satellite System			11/19/98
AD-2	Program Implementation Plan (PIP) for Cooperation Between NOAA and EUMETSAT on an Initial Joint Polar-orbiting Operational Satellite System	EUM.EPS.MGT/980320	1	07/08/99
AD-3	EPS Core Ground Segment Interface Requirements on NOAA Ground Segment	EPS/SYS/IRD/980916	2.2	11/13/01
AD-4	NOAA Interface Requirements on EPS Core Ground Segment	EUM.EPS.SYS.SPE.990 020	2.2	11/13/01
AD-5	Metop Space to Ground Interface Specification	MO-IF-MMT-SY0001	5	10/17/00
AD-6	NOAA-N & N' Satellite to Ground Interface	LMAS IS 23033284		6/30/00
AD-7	NOAA Ground Segment to EPS Ground Segment Interface Control Document	TBW		
AD-8	POES Concept of Operation for IJPS	TBW		
AD-9	POES N and N' User's Guide	TBW		
AD-10	Performance Specification for the NOAA-K, L, M, N & N' Satellites	GSFC-S-480-25.1		11/94

## 1.5 Reference Documentation

Table 1-2 presents a list of Reference Documents (RD-#) that provide additional useful information for successful program implementation.

**Table 1-2 Reference Documents**

Doc #	Title	Reference Number	Issue	Date
RD-1	NOAA Baseline Polar-orbiting Operational Environmental Satellite (POES) Command and Data Acquisition (CDA) and Satellite Operations Control Center (SOCC) Equipment Configuration	NO-IJ/SO-99-0008-R0U0	#2	11/30/99
RD-2	Satellite to Ground Interface (NOAA-KLM)	LMAS IS 3278200		6/13/95
RD-3	NOAA IJPS Communications Requirements (RDN-6)	NOAA-POES/OSD-2001-306R0UD0	#0	12/20/01
RD-4	POES Concept of Operations for POES KLM	NOAA-POES/OSO-2001-0001R0UD0	#0	2/26/01
RD-5	EPS/POES Joint Operations Rules and Procedures (JORP)		#3	3/07/01
RD-6	NOAA Ground Segment Project Plan for IJPS			6/99
RD-7	NOAA IJPS Master Verification and Validation Plan	TBW		
RD-8	NOAA KLM User's Guide			9/00
RD-9	Polar Operational Environmental Satellite Ground Segment Upgrade Description (RDN-5)	NO-IJ/OSD-00-0005-R0U0		5/15/00

## 2.0 POES System Definition for IJPS

### 2.1 System Overview

The overall mission objectives of the POES system is to provide continuous daily global observations of weather patterns and environmental measurements of the Earth's atmosphere, its surface and cloud cover, and the proton and electron flux at satellite altitude [AD-10]. Satellite observations are accomplished with a standard (core) set of environmental instruments from Sun-synchronous orbits. Since the beginning of the POES program, environmental data and products have been provided freely to NOAA users and the world meteorological community.

The IJPS period will begin with the successful launch and commissioning of the EPS Metop-1 satellite. In the IJPS time period, the POES system will continue to support the overall NOAA mission while providing environmental data as an element of the IJPS. Continuous environmental data will be collected from POES satellites, in afternoon orbits, in support of the following mission objectives:

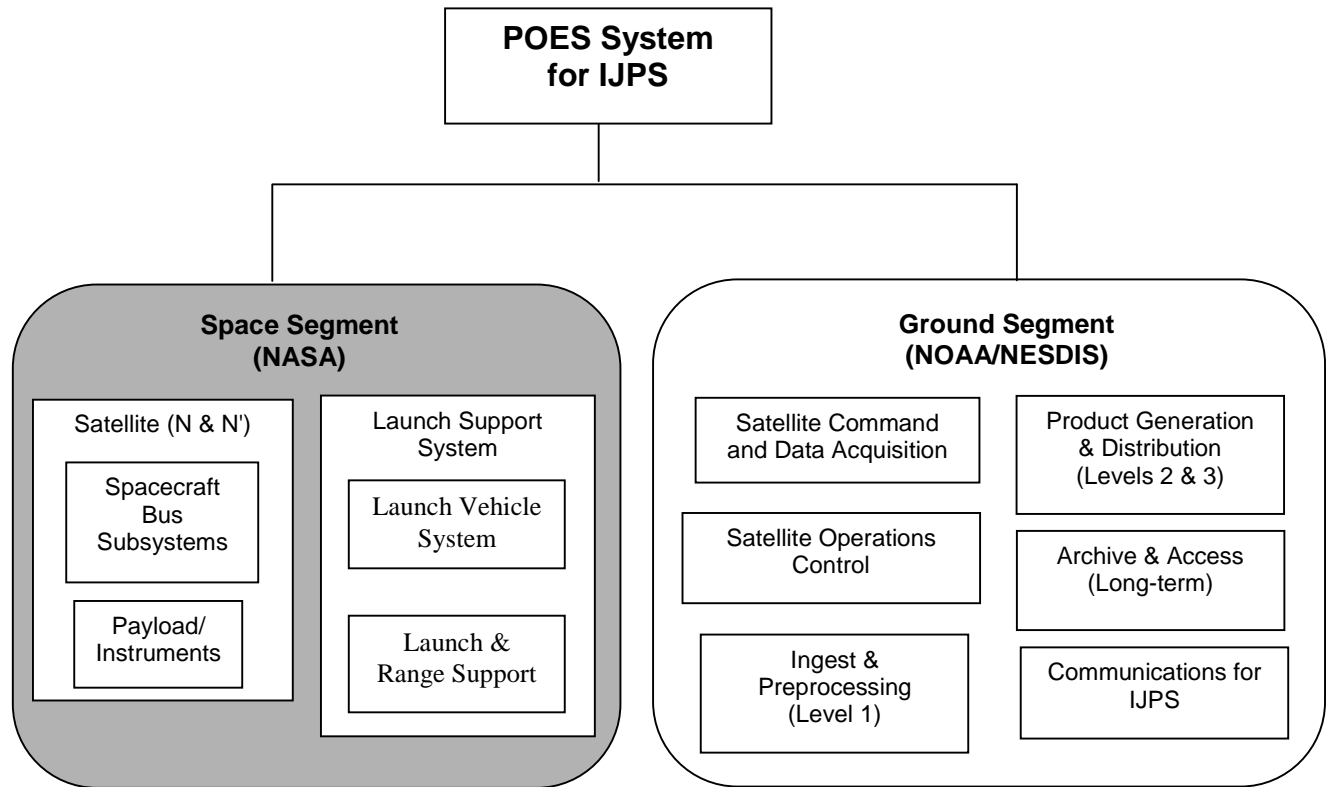
- Global Soundings
- Global Imagery
- Global and Regional Surface and Hydrological Observations
- Data Collection and Location
- Search and Rescue
- Space Environment Monitoring
- Ozone Monitoring

Continuous mission data collected by imagery, sounding, sea ice coverage, and ozone observations will also contribute to and support the overall mission of Climate Monitoring.

Satellite data from the common environmental instruments on the EPS morning satellite (Metop) will be processed by the POES system and distributed to users in lieu of the data from a POES morning satellite [AD-8]. The POES system will also process and distribute the environmental data received from the additional instruments embarked on EPS and POES satellites in accordance with NOAA's data processing priorities, and agreements with EUMETSAT. Similarly, in the IJPS era, the EPS will also process and disseminate POES and Metop data to its users.

The POES system is comprised of two segments, the space and ground segments. Figure 2-1 presents the breakdown of the POES system components.





**Figure 2-1 POES System Components for IJPS**

## **2.2 Segment Overview**

### **2.2.1 Space Segment**

In the IJPS time period, the POES space segment includes the NOAA-N and -N' Satellites (part of IJPS), heritage operational satellites (not part of IJPS) and associated launch support systems required to launch the satellites into their assigned polar orbits [AD-10]. The space segment procurement and implementation, including satellite launch and on-orbit verification, are primarily the responsibility of NASA.

#### **2.2.2.1 POES Satellites**

NOAA-N and -N' are among the fifth generation POES satellites that are being acquired by NASA for NOAA and designated as NOAA-15 (-K), NOAA-16 (-L), -M, -N, and -N'. Each satellite is made up of eight spacecraft bus subsystems plus payload instruments. The spacecraft bus subsystems are as follows:

- Data Handling Subsystem
- Communications Subsystem
- Command and Control Subsystem
- Attitude Determination and Control Subsystem
- Electrical Power and Distribution Subsystem
- Reaction Control Subsystem
- Thermal Control Subsystem
- Structure Subsystem

These satellites incorporate new and upgraded instruments and reliability improvements to extend their on-orbit design life to three years. The NOAA-N and -N' spacecraft will continue to use the fifth generation spacecraft baseline, upgraded with solid-state recorders.

To support the POES mission, NOAA-N and -N' will include a baseline set of instruments described in Table 2-1. This baseline set of instruments is very similar in their functionality to those carried on previous POES satellites.

**Table 2-1 POES Baseline Instrumentation for IJPS**

<b>Instrument</b>	<b>Description</b>
Advanced Very High Resolution Radiometer/3 AVHRR/3	Scanning imaging radiometer with six channels in the 0.6 – 12 microns, 3 visible/near infrared (IR) and three channels in the infrared region. The visible and near IR channels observe vegetation, clouds, lakes, shorelines, snow and ice, and aerosols. The other IR channels detect heat radiation from clouds, land, and water. Only 5 channels are processed at any one time with instrument being commanded to operate on either channel 3a or 3b.
High Resolution Infrared Radiation Sounder/4 HIRS/4	Scanning sounding radiometer with 19 infrared channels in the range 3 – 15 microns, and one visible channel. Radiance measurements are taken in 19 spectral regions of the IR band and one in the visible band for relatively high resolution soundings to an altitude of about 40 km.
Advanced Microwave Sounding Unit-A1/-A2, AMSU-A1/-A2	AMSU-A1/-A2-Part of microwave sounder suite with 15 channels in the range 23 – 90 GHz. <u>AMSU-A1</u> - Channels 3 – 15 provide data for vertical temperature profiles. <u>AMSU-A2</u> - Channels 1 and 2 provide information on surface water and precipitation enhancing sounding measurements.
Microwave Humidity Sounder MHS	Microwave sounder with 5 channels at 89, 150 and around 183 GHz for measuring profiles of atmospheric water vapors.
Space Environmental Monitor SEM/2	Multi-channel charged-particle spectro-meter that measures the Earth's radiation belts and the particle precipitation phenomena resulting from solar activity.
Search and Rescue Satellite Aided Tracking System SARSAT	UHF receiver and signal processor and VHF/UHF/L-Band Transponder for receiving distress signals from emergency beacons at international distress frequencies and retransmits them at 1544.5 MHz
ARGOS/Data Collection System/2 DCS/2	UHF receiver and signal processor that relays meteorological and other data transmitted from in-situ ground-based sensors.
Solar Backscatter-Ultraviolet Spectral Radiometer/2 (unique to NOAA satellites) SBUV/2	Ultraviolet nadir-staring, non-spectral scanning spectrometer that measures backscattered solar radiation in the ultraviolet Hartley-Huggins bands. Measurements provide basis for determining the total ozone concentration and its vertical distribution in the atmosphere.

With the exception of the SBUV instrument (unique to NOAA satellites), the above instrument-types are part of a common “core” set of instruments to be flown on both POES and EPS (Metop) satellites.

Several of the core instruments on NOAA-N and -N’ will differ from the current POES series, NOAA-KLM. The following instruments will be either upgraded or replaced as follows:

- HIRS/3 will be upgraded to HIRS/4 with a smaller field of view, but the same sampling distance.
- Microwave Humidity Sounder (MHS) will replace the AMSU-B unit measuring scene radiance in 5 microwave bands.
- DCS/2 will be embarked on NOAA-N and will be upgraded for NOAA-N’ with an Advanced DCS (A-DCS) unit.
- SARSAT processor (SARP-2) on NOAA-N will be upgraded to a new configuration (SARP-3) for NOAA-N’.

Heritage NOAA satellites, that are still in operation in the IJPS period, will require continued support from the POES ground segment.

### **2.2.1.2 Launch Support System**

The launch support system is comprised of the launch vehicles for NOAA-N and -N' and all support and services required to place those satellites into their desired orbit. POES are launched into orbit by a space launch vehicle system (SLVS) provided by NASA that can satisfy all mission requirements. NOAA-N and -N' will be launched into orbit by the Delta SLVS. NOAA-M is currently scheduled for launch in 2002 using the Titan II system.

The Western Test Range will provide range support services during prelaunch and launch operations for all POES satellites. In addition, NASA's Deep Space Network and the Air Force's Satellite Control Network/Facility will provide support during launch to early orbit operations.

### **2.2.2 Ground Segment**

The current POES Ground Segment (PGS) baseline includes Command and Data Acquisition (CDA) stations located at Fairbanks, and Wallops, and the Satellite Operations Control Center (SOCC) and Central Environmental Satellite Computer System (CEMSCS) located in Suitland [RD-1]. Also included in the baseline are NESDIS Level 2 product generating systems and long-term archive/access facilities.

The Fairbanks and Wallops CDAs have the capability to serve as operational backup facilities to the SOCC for satellite command and control functions. At present, operational plans [RD-4] designate Wallops as the primary backup site to support SOCC for these functions.

CEMSCS is a collection of information processing components and information technology capabilities within NESDIS that are organizationally part of the Information Processing Division (IPD). For the POES IJPS, it includes the Ingest and Preprocessing Systems (IPS) and Product Generation and Distribution Systems (PGD) functions. CEMSCS also houses the on-line storage system called the Satellite Active Archive (SAA), which stores Level 1 and 2 data sets for users.

Also within NESDIS, products are produced by the Product Generating Systems that are external to CEMSCS. These systems obtain the Level 1 data sets generated by the CEMSCS and process products to Level 2 and beyond.

Archive and Access (long-term storage) functions are distributed among several NESDIS facilities. The National Climatic Data Center (NCDC) is responsible for the long-term preservation and management of all Level 1 and most high-level POES data sets. The National Oceanographic Data Center (NODC) is responsible for the long-term preservation and management of selected Level 2 Oceanographic data sets. The SAA is a CEMSCS component that provides on-line storage and user access to Level 1 and selected Level 2 data sets.

Communication services are provided across the ground segment to link PGS operational sites with each other, and with its community of national and international users.

The PGS will use the existing ground segment baseline to support the IJPS with numerous hardware and software system upgrades/modifications to ground segment elements.

## 2.3 PGS Elements Overview

The PGS is divided into six primary functional elements for the purpose of allocating requirements in this document. They are:

- Command & data acquisition element, located at the Fairbanks, Alaska, and Wallops, VA, stations
- Satellite operations, control and health & safety monitoring element located at the SOCC in Suitland, MD.
- Data ingest and preprocessing (Level 1 product) element located at the CEMSCS in Suitland, MD.
- Product generation and distribution (Levels 2 & 3 products) element located at the OSDPD in Suitland, MD.
- Long term data archive and access elements are located at NCDC, Asheville, NC., NODC, Silver Spring, MD, and at SAA in Suitland, MD.
- The Communications (COMM) element provides the communications network infrastructure and connections between the Suitland interface and the Darmstadt interface, and among the PGS elements.

## 2.4 PGS Interfaces

The PGS interfaces with entities that are outside the domain of the POES system, but which are required to provide the full mission functions and fulfill mission objectives. These interfaces provide information to the POES System and/or receive information from the POES System, and include the following:

- The EUMETSAT Core Ground Segment (CGS)
- User Communications
- Global Positioning System (GPS)
- Air Force Satellite Control Network (AFSCN)
- NASA
- NWS
- Direct Broadcast Users
- Department of Defense (DOD) Users

### 3.0 POES System Requirements for IJPS

This section presents the formal set of new/additional requirements levied on the NOAA POES System to support the IJPS. Existing requirements in place for the current operational POES System shall be continued in the IJPS period without any interruption. Based on that assumption, NOAA/NESDIS will continue supporting the NOAA-N and -N' satellites in an identical manner in all operational aspects to the prior generation of NOAA afternoon satellites.

The new requirements introduced by this document represent additions and/or modification to the existing POES System requirements due to NOAA's participation in the IJPS operation and services. New requirements include providing mutual cross-support capability for satellite commanding and data acquisition, and acquiring global data from satellites that are not in view of their respective CDA station. Each satellite provides continuous direct broadcast of real time environmental data to ground stations and also stores one complete orbit of mission data to be downloaded on command to a dedicated ground station.

The EPS space segment includes the Metop-1 and -2 satellites. The Metop satellites introduce a number of features not currently supported by the POES Ground Segment. The features include stored global 1 km resolution imagery; use of an X-band downlink for stored instrument data, auxiliary bus data and housekeeping telemetry from the satellite to a ground segment; new High Resolution Picture Transmission (HRPT) and Low Resolution Picture Transmission (LRPT) data formats; use of the Consultative Committee for Space Data Systems (CCSDS) downlink data format; and selective data encryption [AD-3, AD-4, AD-7, RD-3].

In addition to the above changes, all global data received by each ground segment (POES and EPS) will be exchanged in support of the IJPS mission. The PGS will also process global data received from the Metop satellite and distribute products to the NOAA user community [AD-8, RD-4].

Further descriptions of the ground segment baseline configurations and planned PGS element upgrades to support the IJPS are included in the POES Ground Segment Upgrade Description and other documents [RD-1, RD-2, RD-3].

#### (a) Levels of Requirements

Levels are used to manage and control the POES system upgrade process and tasks for the IJPS. Three levels of requirements are defined. They are the System, Segment and Element levels. The System level defines requirements for the POES System including its interfaces to external entities. The Segment Level defines requirements for the Space and Ground segments based on allocation from the system level requirements. The Element Level defines requirements for the six ground segment elements based on allocation from the Ground Segment requirements.

(b) Requirement Traceability

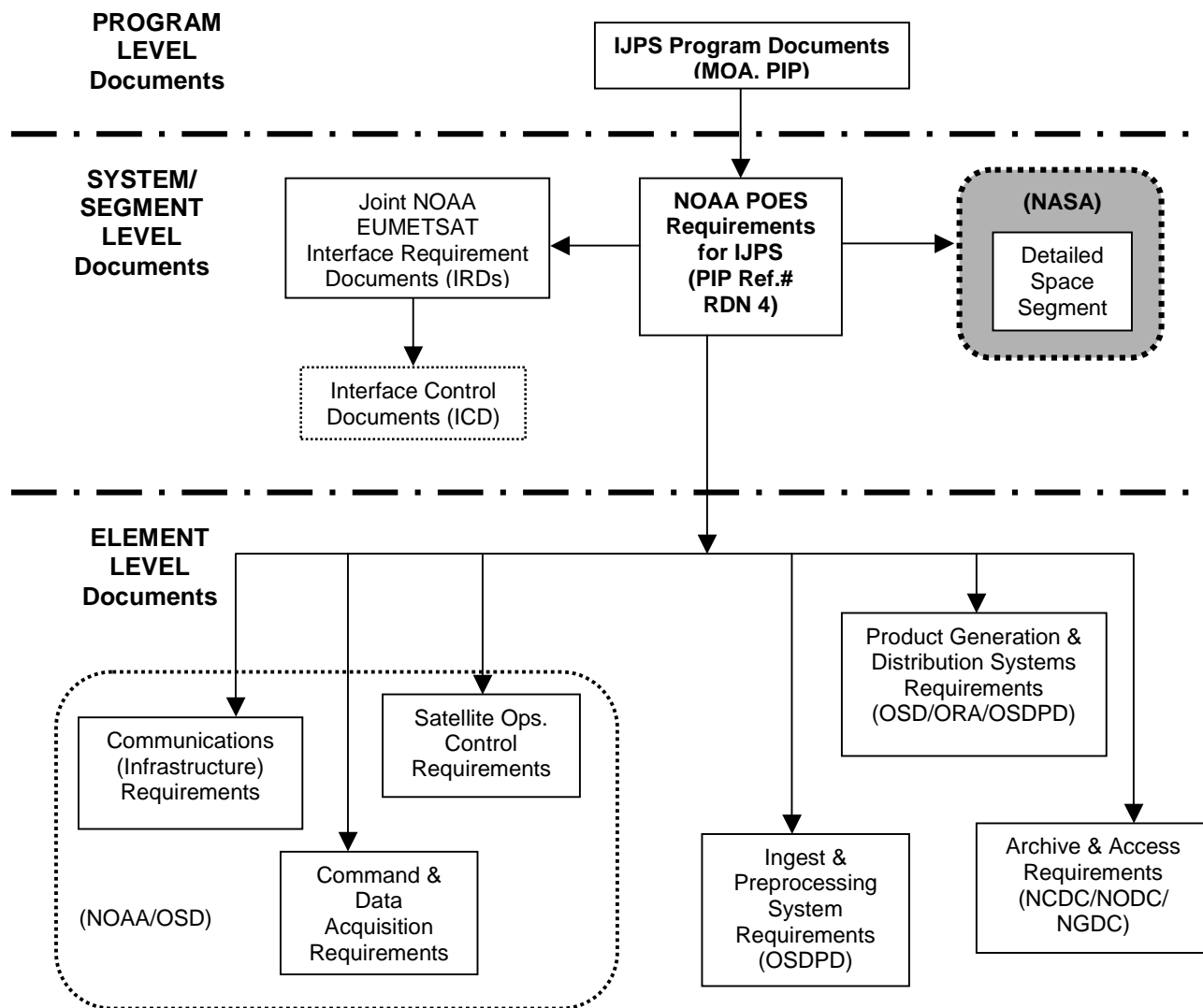
Traceability refers to the relationship between requirements (parent-child relationship), and between requirements and their verification method/level. System requirements are allocated to the Segment, and the segment requirements are allocated to the Elements. To facilitate requirement traceability between levels, all requirements have a unique identifier (ID). A Requirement Traceability and Verification Matrix (RTVM) shall be included in all POES requirement documentation. The RTVMs for the requirements stated, at system and segment levels, in this document are presented in Attachments A-1 and A-2.

(c) POES Requirement Documentation for IJPS

The POES requirement documentation hierarchy is shown in Figure 3-1. Referring to Figure 3-1, at the Program level, are the Memorandum of Agreement [AD-1], and the Program Implementation Plan (PIP) [AD-2] documents, which are the IJPS source program documents. Shown at the System/Segment level, is this POES System Requirements for IJPS document, which is designated as "RDN-4" in the PIP. All POES System requirements stated in this document are traceable to statements and/or agreements made in either or both of these source documents.

Also shown are the Interface Requirement Documents (IRDs) [AD-3 through AD-6]. Using the POES and EPS system level requirements documents as the source, the IRDs define the NOAA-EUMETSAT interface requirements, and are jointly developed and agreed to by NOAA and EUMETSAT. The IRDs lead to the joint development of Interface Control Documents (ICDs).

The Element Level requirement documentation shown is the responsibility of the pertinent NOAA/NESDIS organization. Each of those functional organizations shall develop their respective requirement documentation, conforming to their existing internal requirement development process/procedures, for implementing their portion of the system upgrades for the IJPS. However, each requirement in those documents shall provide traceability to their corresponding (parent) requirement in Section 3.3.X of this document.



**Figure 3-1 NOAA IJPS Requirements Documentation Hierarchy**



(d) Terminology/definitions referred to in this document

- NOAA-N and -N': Afternoon equatorial crossing (2 PM, ascending) satellites, total responsibility of NOAA/NESDIS, essentially continuation of the current POES system with required upgrades for IJPS support.
- Metop-1 and -2: Morning equatorial crossing (9.30 AM, descending) satellites, total responsibility of EUMETSAT. These satellites replace the NOAA morning satellites in the IJPS period.
- Data Types:
  - (i) Metop Global Data - Global Data Stream (GDS), X-band downlink at 70Mbps.
  - (ii) NOAA Global Data - GAC data stream, S-band downlink at 2.66Mbps
  - (iii) Direct broadcast Metop High Resolution Picture Transmission (MHRPT).
- Data Transmission Modes:
  - (i) Pipeline: data of one orbit continuously transmitted in “granules” (discrete quanta), processed and distributed within the time of the next orbit.
  - (ii) Throughput mode: data are transmitted without any delay other than that required for the transmission itself and the data throughput IN equals the data throughput OUT.
- Blind Orbit: Orbit that could not be acquired by the satellite nominal ground station i.e. Fairbanks and Wallops for NOAA and Svalbard PCDAS for Metop. The reasons for not being able to acquire the data include failure scenarios, non-visibility from the ground station, cross-support for satellite operations upon request for specific operations.
- Split Mission: The acquisition of mission data is split between two similar (POES or Metop) operational satellites; to accommodate for one or more failed instruments on one or the other satellite.
- Cross Support: One agency assisting the other, including contingency support, upon request by either for specific services.
- Interfaces:
  - (i) Suitland Interface - NOAA single point interface at Suitland for EPS to acquire IJPS satellite data and information per mutual agreement.
  - (ii) Darmstadt Interface - EPS single point interface at Darmstadt for NOAA to acquire IJPS satellite data and information per mutual agreement.
  - (iii) Generic File Transfer (GFT) Interface - Interface between NOAA and EUMETSAT for exchange of auxiliary/ancillary type of data. Transfer protocol will be described in the NOAA G/S to EPS G/S ICD (TBW).

- (iv) Near Real Time (NRT) – Local (Darmstadt) interface for NOAA to receive Metop Level 1 products from EPS.
- Definitions:
  - (i) TBC - to be confirmed: Open issue, exact value/quantity/implementation yet to be decided
  - (ii) TBD - to be determined: Open issue, under discussion
  - (iii) TBS - to be supplied: Open issue, under analysis
  - (iv) TBW - to be written: document under development

**Table 3-1 NOAA and EUMETSAT Product Level Definitions**

Processing Level	NOAA	EUMETSAT
0	Unprocessed telemetry data as received at CEMSCS/Ingest from the observing platform excluding communications artifacts introduced by the ground system.	Composed of instrument source packets over time interval (CCSDS packets) appended with auxiliary and ancillary data and associated quality flags. IASI level 0 data are precalibrated spectra and uncalibrated images.
1a	AVHRR and AIP telemetry data that have been extracted but not decommutated from Level 0 and formatted into time-sequenced data sets for NOAA/CEMSCS internal processing only.	Instrument reformatted level 0 data with auxiliary and ancillary data. Pixel localization and calibration coefficients are computed. They are appended along with all auxiliary and ancillary data required to compute them (e.g. calibration target counts and orbit parameters). IASI level 1a data are post calibrated spectra and calibrated images.
1b	Discrete, instrument-specific packetized data sets derived from Level 1a data, containing unprocessed data at full resolution, time-referenced, and annotated with ancillary information including data quality indicators, calibration coefficients and georeferencing parameters, all appended.	Radiometrically corrected and calibrated data in physical units at full instrument resolution as acquired. IASI level 1b data are as level 1a but re-sampled to a nominal wavenumber grid.
1b*	Uncompressed and unpacked Level 1b data sets, with appended earth location data and time-tagged instrument counts with calculated calibration parameters. These data sets are for CEMSCS internal use only.	N/A
1c	NOAA currently does not have Level 1c.	In the case of IASI, apodized data with radiance clusters derived from AVHRR pixels in the IASI FOV. In the case of ATOVS, sounding and/or imager data remapped on a common instrument grid. N/A for ASCAT, GOME-2 and GRAS.
2	Data products that are derived geophysical variables at the same resolution and locations as the Level 1 source data.	Retrieved environmental variables at the same resolution and location as level 1 source data. May also include geophysical products derived by combination of data from various instruments on a single pass basis.
3	Data products that are variables mapped on uniform space-time grid scales, usually with some completeness and consistency.	Gridded point geophysical products on a multi-pass basis.

(e) Requirement Identification

Requirements are presented in delineated paragraphs of text, including a requirements header and text paragraphs. Each section has the following requirement categories:

- Functional: What the system must do - "a capability".
- **Note:** Any applicable performance requirement to this functional requirement should be found under "Performance" in the same section.
- Operational: "What", "when", "where", "how long" etc. a system does, and may require operator's assistance.
- Interface: Aspects unique to the interface for the system "to interact" with others.
- Performance: "How well" the system must do, in quantifiable units.

The format for requirements identification is as follows:

Requirement Identifier (ID)	Verification Method
Text Paragraph	

- The **Requirement ID** is defined as follows:

For **System Requirements**, the requirement ID is in the form: PSYS, <a.b.c.d.>-<number>", followed by text paragraph(s).

Where,

<a.b.c.d.> corresponds to the subsection number in which the requirement is contained.

<number> is a sequential number for the requirement.

**Verification Method:** This defines the selected method of verification for the requirement as per Table 3-1.

**Table 3-2 Verification Methods**

Verification Method	Definition
ANALYSIS	Analysis is an engineering assessment and/or mathematical process that may include computer modeling and/or simulation to determine compliance with specification requirements.
DEMONSTRATION	Demonstration is the determination of properties and performance involving proof-by-doing.
INSPECTION	Inspection is the examination or measurement of product characteristics or the review of design, production or test documentation to determine compliance with specified requirements.
TEST	Test is the exercise of hardware, software, or operations to measure quantitatively specified requirements.
Joint Demonstration/Test (JD/JT)	Joint demo/test is the exercise of hardware, software, or operations that involve both the POES and EPS systems to jointly accomplish the desired objective(s).

### 3.1 System Requirements

The requirements listed herein are applicable to the POES system in the IJPS period. These requirements introduce new functionality and/or operations to the legacy POES System and its elements for participation in the IJPS.

Requirements applicable to the areas of Quality Control Standards, Maintainability, Training and Logistics are not specifically mentioned in this document based on the understanding that each element of the POES System is an operational entity and hence shall adopt their existing practice in these areas.

#### 3.1.1 Functional

PSYS-3.1.1-010

Joint Demo

The POES system shall collect, exchange, archive and disseminate global environmental data to users for determining the state of the Earth's environment for application to operational meteorological and environmental forecasting and global climate monitoring in support of the IJPS mission. [AD-2, 2.4.1]

PSYS-3.1.1-015

Joint Demo

The POES system shall collect, exchange and disseminate local data in real time to users for operational meteorological and environmental forecasting in support of the IJPS mission. [AD-2/3.1]

PSYS-3.1.1-020

Demo/Inspection

The POES system shall be comprised of the following:

- (a) A series of two operational satellites (NOAA-N and -N') flown consecutively in an orbit with an "afternoon" equatorial crossing time (ascending node) [3.1]
- (b) A series of two spacecraft with a set of common (with Metop) instruments (AVHRR, HIRS, AMSU-A, MHS, SEM, SARSAT and A-DCS) [AD-2, 2.5.1, 3.1, 3.2.1] and an additional instrument (SBUV) unique to the POES mission. [AD-2, 3.1]
- (c) At least one Command and Data Acquisition (CDA) station and a geographically separate back-up [AD-2, 3.1]
- (d) At least one Satellite Operations Control Center and a geographically separate back up
- (e) At least one Data Processing, Distribution and Archive Facility [AD-2, 3.1]
- (f) Telecommunications capabilities for command, telemetry and data exchange. [AD-2/3.1, 3.2.1, 3.2.3]

PSYS-3.1.1-030

Demo (NASA)

The POES system global data shall include the NOAA satellite instrument set, MHS instrument and spacecraft/instrument state of health. [AD-2/3.1]

PSYS-3.1.1-040

Joint Demo

The Metop global data (GDS) acquired by the POES system from the EPS ground segment shall include the common instrument set and the additional Metop instrument set (Infrared Atmospheric Sounding Interferometer (IASI), Advanced Scatterometer (ASCAT), Global Navigation Satellite System Receiver for Atmospheric Sounding (GRAS), and Global Ozone Monitoring Experiment (GOME-2)), spacecraft/instrument state of health and administrative messages. [AD-2/3.1]

PSYS-3.1.1-050

Joint Test

The POES system shall retrieve the Metop satellite global data from the EPS. [AD-2/3.6.3]

PSYS-3.1.1-060

Joint Demo

The POES system shall provide a throughput mode commanding access and transmit capability to one Metop operational satellite at a time via a PGS CDA station, for cross-support operations. [AD-2/3.6.1.2]

PSYS-3.1.1-070

Joint Demo

The POES system shall receive housekeeping telemetry data from one Metop operational satellite at a time while over the PGS CDA station for cross-support operations and make it available to EPS, in a real time throughput mode. [AD-2/3.6.1.2]

PSYS-3.1.1-075

Joint Test

The POES system shall acquire real time MHRPT data from one Metop operational satellite at a time while over either PGS CDA stations and process/extract any selectable instrument and telemetry data, and transfer it to the NOAA IPS element. [NOAA]

PSYS-3.1.1-080

Analysis

The POES system shall be sized to provide blind orbit cross-support to one Metop operational satellite at a time, any additional requests to be accommodated within the sizing of the system. [AD-2/3.6.1.2, 3.6.3]

PSYS-3.1.1-090

Joint Demo

The POES system shall be capable of scheduling, generating and transferring satellite commands to the NOAA-N and then NOAA-N' satellites via the EPS ground segment, in real time, for NOAA blind orbit cross-support operations. [AD-2, 3.6.1.2]

PSYS-3.1.1-100

Joint Demo

The POES system shall acquire NOAA-N and NOAA-N' real time housekeeping telemetry data made available by the EPS for NOAA blind orbit and cross-support operations. [AD-2, 3.6.1.2]

PSYS-3.1.1-105

Joint Demo

The POES system shall acquire the NOAA-N and -N' telecommand-echo made available by the EPS PCDA station in real time, for NOAA blind orbit and cross-support operations. [AD-2, 3.6.1.2]

PSYS-3.1.1-110

Joint Test

The POES system shall make available to EPS the operational NOAA satellite global data received by the PGS CDA station. [AD-2, 3.6.3]

PSYS-3.1.1-120

Joint Demo

The POES system shall be capable of receiving global data from one operational Metop satellite at a time, while over the PGS CDA station, for EPS blind orbits. [AD-2, 3.6.3, AD-3, 4.2, AD-5]

PSYS-3.1.1-130

Joint Demo

The POES system shall make available to EPS the operational Metop satellite global data acquired by the PGS CDA station. [AD-2, 3.6.3]

PSYS-3.1.1-140

Joint Demo

The POES system shall retrieve from the EPS ground segment the global data of the operational NOAA-N and -N' satellite for NOAA blind orbits. [AD-2, 3.6.3]

PSYS-3.1.1-150

Joint Demo

The POES system shall complete the transfer of the Metop global data from orbit n, to the Suitland Interface for EPS to retrieve, before the scheduled acquisition from n+1. [AD-2, 3.6.3]

PSYS-3.1.1-160

Joint Demo

The POES system shall make available to EPS the MHS housekeeping data received from the NOAA satellites. [AD-2, 3.6.1.3]

PSYS-3.1.1-170

Joint Demo

The POES system shall acquire the housekeeping data of the NOAA provided instruments on Metop, made available by the EPS ground segment. [AD-2, 3.6.1.3]

PSYS-3.1.1-180

Joint Demo

The POES system shall make available to the EPS all the data necessary to preprocess NOAA satellite instrument data (e.g. satellite ephemeris or orbital-state, on-board time correlation, instrument calibration parameters and updates). [AD-2, 3.1, 3.6.3]

PSYS-3.1.1-190

Joint Demo

The POES system shall acquire from EPS all data necessary to preprocess Metop satellite instrument data (e.g. satellite ephemeris or orbital state, on-board time correlation, instrument calibration parameters and updates). [AD-2, 3.1, 3.6.3]

PSYS-3.1.1-200

Joint Demo

The POES system shall be capable of ingesting, preprocessing the Level 0 common instruments data extracted from the Metop global data, to NOAA Level 1 (i.e. sorting of the data, earth location and appending or application of the calibration coefficients, and performance of the associated quality control). [AD-2, 3.6.4]

PSYS-3.1.1-210

Test

The POES system shall be capable of ingesting and preprocessing any selectable instrument and telemetry data extracted from Metop HRPT received at PGS CDA station, for NOAA users. [NOAA requirement]

PSYS-3.1.1-215

Joint Demo

The POES system shall be capable of producing products from the common instruments data extracted from the Metop global data. [AD-2, 3.6.4]

PSYS-3.1.1-220

Demo, Joint Test

The POES system shall receive and process the Metop instrument Level 1 data from the EPS to meet NOAA user requirements. [AD-2, 3.6.4]

PSYS-3.1.1-230

Demo

The POES system shall distribute all preprocessed global data and products produced by NOAA to the user community. [AD-2, 3.6.4]

PSYS-3.1.1-240

Demo

The POES system shall archive global data and associated databases received from the EPS. [AD-2, 3.6.4]

PSYS-3.1.1-250

Demo

The POES system shall archive all products generated by the PGS. [AD-2, 3.6.4]

PSYS-3.1.1-260

Demo

The POES system shall provide for telecommunications capabilities among the PGS elements and existing external interfaces, to ensure timely and reliable exchange of command,

telemetry/housekeeping and global data, and systems information in support of IJPS operations. [AD-1, 3.3.4, AD-2, 3.6.1.2, 3.6.1.3, 3.6.3]

PSYS-3.1.1-270

Joint Demo

The POES system shall provide for telecommunications capabilities between the Suitland Interface and the Darmstadt Interface, to ensure timely and reliable exchange of command, telemetry/housekeeping and global data, and system information in support of IJPS operations. [AD-1, 3.3.4, AD-2, 3.6.1.2, 3.6.1.3, 3.6.3]

PSYS-3.1.1-280

Demo

The POES system shall maintain instrument calibration databases for the Metop satellite instruments to support product generation needs in the IJPS period. [AD-2, 3.6.4]

### **3.1.2 Operational**

PSYS-3.1.2-010

Analysis

The POES system operational phase for an IJPS satellite shall start upon the successful completion of the System Commissioning Review (SCR) for Metop satellites and On-orbit Verification Review for NOAA satellites. [AD-2, 3.6.1.1]

PSYS-3.1.2-020

Demo (NASA)

The POES system shall control the day-to-day operations, in coordination with the EPS ground segment, anomaly resolution and health/safety of NOAA satellites including all instruments (regardless of the origin) in the IJPS period. [AD-2, 3.6.1.1, 3.6.4]

PSYS-3.1.2-030

Demo

The POES system shall provide for a rolling archive of 7 days of the NOAA-N and N' and Metop global data acquired at the CDA stations. [AD-2, 3.6.3]

PSYS-3.1.2-040

Joint Analysis

The POES system shall develop detailed joint plans and procedures with EPS for supporting nominal, contingency and split-mission scenario operations. [AD-2, 3.6.2]

### **3.1.3 Interface**

PSYS-3.1.3-010

Joint Demo

The POES system shall be capable of interfacing with the EPS space segment as defined in AD-5 (L, S, and X bands). [AD-2, 3.6.1.2, 3.6.3]



PSYS-3.1.3-020

Joint Demo

The POES system shall be capable of exchanging data with EPS as established in Article 8 of the IJPS Agreement and as applicable to NOAA. [AD-2, 3.6.3]

PSYS-3.1.3-030

Joint Demo

The POES system shall provide for a NOAA Suitland Interface for data exchange, cross-support operational activities, day-to-day joint tasks coordination, and blind orbit support with the EPS. [AD-2, 3.6.1.2, 3.6.2]

PSYS-3.1.3-035

Joint Demo

The POES system shall provide for a voice loop exchange for operational coordination with the EPS. [AD-2, 3.6.2]

PSYS-3.1.3-040

Demo

The POES system shall be capable of interfacing with the EPS for NOAA to retrieve/exchange information in support of IJPS operations. [AD-2, 3.6.3]

PSYS-3.1.3-050

Demo

The POES system shall provide an interface for the distribution of the NOAA global data, to users and the Department of Defense in the IJPS period. [Shared Processing Agreement]

PSYS-3.1.3-060

Demo

The POES system shall provide an interface for the distribution of the common instrument data extracted from Metop global data, to users and the Department of Defense in the IJPS period. [Shared Processing Agreement]

### 3.1.4 Performance

PSYS-3.1.4-010

Analysis

The POES system shall be capable of supporting the launch of a new NOAA satellite within 120 days of notification. [MOA, 4.1.3]

PSYS-3.1.4-020

Joint Test

The POES system shall make available to the EPS the data on a mutually agreed basis and meet the processing timeliness, as defined at the Segment and Element levels. [AD-2, 3.6.3]

PSYS-3.1.4-030

Test

The POES system shall complete product processing of any selectable instrument and telemetry data, extracted from MHRPT received at a PGS CDA station and deliver product to users in less than 30 minutes from observation. [Data Services Oversight Panel]

## 3.2 Segment Requirements

### 3.2.1 Space Segment

The requirement structure format is the same as described in Section 3.1, except as noted below. The **Requirement ID** is defined as follows:

For **Space Segment Satellite Requirements**, the requirement ID is in the form: PSAT, <a.b.c.d.>-<number>”, followed by text paragraph(s).

For Space Segment Launch Support System Requirements, the requirement ID is in the form:

PSLV, <a.b.c.d.>-<number>”, followed by text paragraph(s).

Where,

<a.b.c.d.> corresponds to the subsection number in which the requirement is contained.

<number> is a sequential number for the requirement.

**Verification Method:** This defines the selected method of verification for the requirement as per Table 3-2.

As previously stated, requirements applicable to the areas of Quality Control Standards, Maintainability, Training and Logistics are not specifically mentioned in this document based on the understanding that each element of the POES System is an operational entity and hence shall adopt their existing practice in these areas.

#### 3.2.1.1 Satellite (POES)

##### 3.2.1.1.1 Functional

PSAT-3.2.1.1.1-010

Analysis, Joint Test (NASA)

The POES shall collect, store and transmit global environmental data on command to an IJPS CDA station in support of the IJPS mission. [PSYS-3.1.1-010]

PSAT-3.2.1.1.1-020

Analysis (NASA)

The POES shall provide for two satellites, NOAA-N and NOAA-N', flown consecutively into orbit with an afternoon equatorial crossing time (ascending node). [PSYS-3.1.1-020]

PSAT-3.2.1.1.1-030

Inspection (NASA)

The POES shall be comprised of a common set of on-board instruments (AVHRR, HIRS, AMSU-A, MHS, SEM, SARSAT, DCS) and an SBUV instrument. [PSYS-3.1.1-020]

PSAT-3.2.1.1.1-040

Analysis (NASA)

The POES shall transmit global science data that includes data from the common instrument set and the additional SBUV instrument. [PSYS-3.1.1-030]

PSAT-3.2.1.1.1-050

Analysis (NASA)

The POES shall transmit direct broadcast of high resolution and low-resolution picture transmission. [PSYS-3.1.1-015]

PSAT-3.2.1.1.1-060

NASA LEO Analysis

The POES shall transmit spacecraft housekeeping telemetry to CDA stations. [PSYS-3.1.1-100]

#### **3.2.1.1.2 Operational**

PSAT-3.2.1.1.2-010

Analysis

The POES shall have an on-orbit design life as defined in AD-10. [PSYS-3.1.1-020]

#### **3.2.1.1.3 Interface**

PSAT-3.2.1.1.3-010

Test

The POES shall conform to space-to-ground interface specifications as defined in AD-6. [PSYS-3.1.1-020]

#### **3.2.1.1.4 Performance**

PSAT-3.2.1.1.4-010

Demo

The POES shall conform to the performance characteristics as defined in NASA document, AD-10. [PSYS-3.1.1-020]

### **3.2.1.2 Launch Support System**

#### **3.2.1.2.1 Functional**

PSLV-3.2.1.2.1-010

Analysis (NASA)

The launch support system shall provide for all launch vehicle, launch support, training and documentation for placing each POES in it's assigned orbit. [PSYS-3.1.1-020]

#### **3.2.1.2.2 Operational**

PSLV-3.2.1.2.2-010

Analysis (NASA)

The launch support system shall conform to launch configuration and operational sequence as agreed between the NASA and NOAA POES Program. [PSYS-3.1.1-020]

#### **3.2.1.2.3 Interface**

PSLV-3.2.1.2.3-010

Analysis (NASA)

The launch support system shall interface with the POES as defined per NASA document, RD-1. [PSYS-3.1.1-020]

#### 3.2.1.2.4 Performance

PSLV -3.2.1.2.4-010

NASA Analysis

The launch support system shall place POES in the "afternoon equatorial crossing" orbit as defined by NASA and in RD-1. [PSYS-3.1.1-020]

PSLV -3.2.1.2.4-020

NASA Analysis

The launch support system shall be capable of supporting the launch of a new NOAA satellite within 120 days of call-up notification. [PSYS-3.1.4-010]

### 3.2.2 POES Ground Segment (PGS)

The requirement ID structure format is the same as described in Section 3.1, except as noted below.

For **PGS Level Requirements**, the requirement ID is in the form: PGS<sub>L</sub>, <a.b.c.d>-<number>”, followed by text paragraph.

As previously stated, requirements applicable to the areas of Quality Control Standards, Maintainability, Training and Logistics are not specifically mentioned in this document based on the understanding that each element of the POES System is an operational entity and hence shall adopt their existing practice in these areas. Based on the same understanding, it is incumbent upon each element to ensure the continuation of all existing POES System activities and that the IJPS Upgrades to the POES System shall not degrade existing activities and practices.

#### 3.2.2.1 Functional

PGSL-3.2.2.1-010

Demo

The PGS shall collect, exchange, store and disseminate global environmental data to users for application to operational meteorological and environmental forecasting and global climate monitoring in support of the IJPS mission. [PSYS-3.1.1-010]

PGSL-3.2.2.1-020

Inspection

The PGS shall include at least one primary (Fairbanks) and a backup CDA station. [PSYS-3.1.1-020]

PGSL-3.2.2.1-030

Inspection

The PGS shall include at least one primary and a backup SOCC. [PSYS-3.1.1-020]

PGSL-3.2.2.1-040

Inspection

The PGS shall include at least one data processing, distribution and archive facility. [PSYS-3.1.1-020]

PGSL-3.2.2.1-050

Demo

The PGS shall be capable of acquiring from the Darmstadt Interface, the operational Metop satellite global data, made available by EPS. [PSYS-3.1.1-040, PSYS-3.1.1-050]

PGSL-3.2.2.1-060

Demo

The PGS shall be capable of acquiring from the Darmstadt Interface, the NOAA satellite blind orbit global data, made available by EPS. [PSYS-3.1.1-140]

PGSL-3.2.2.1-070

Demo

In the event the global data from NOAA-N or N' satellites is unavailable from EPS, the PGS shall be capable of acquiring the Stored AIP (SAIP) or Stored TIP (STIP) data from the Darmstadt Interface. [PSYS-3.1.1-140]

PGSL-3.2.2.1-080

Demo

The PGS shall be capable of receiving, transporting (in throughput mode) and uplink telecommand to the Metop satellites through the Fairbanks CDA station, for Metop blind orbits, in compliance with performance requirements in Sec. 3.2.2.4. [PSYS-3.1.1-060]

PGSL-3.2.2.1-090

Demo

The PGS shall be capable of receiving the global and housekeeping telemetry data from one operational Metop satellite at a time, at the Fairbanks CDA, for EPS cross-support operations. [PSYS-3.1.1-070, PSYS-3.1.1-120]

PGSL-3.2.2.1-100

Demo

The PGS shall be capable of delivering to the Suitland Interface the global data acquired from the Metop satellite, by the Fairbanks CDA station, in compliance with performance requirements stated in Section 3.2.2.4. [PSYS-3.1.1-130]

PGSL-3.2.2.1-110

Demo

The PGS shall be capable of delivering to the Suitland Interface the operational Metop housekeeping telemetry data in throughput mode, for cross support and in compliance with performance requirements stated in Section 3.2.2.4. [PSYS-3.1.1-070]

PGSL-3.2.2.1-115

Demo

The PGS shall receive the MHRPT data in real time at the PGS CDA stations. [PSYS-3.1.1-015, PSYS-3.1.1-075]

PGSL-3.2.2.1-116

Demo

The PGS shall be capable of extracting and preprocessing any selectable instrument and telemetry data, from the MHRPT data for NOAA users. [PSYS-3.1.1-075]

PGSL-3.2.2.1-120

Demo

The PGS shall be sized to provide blind orbit cross-support to one operational EPS satellite with any additional requests to be accommodated within the sizing of the system. [PSYS-3.1.1-080]

PGSL-3.2.2.1-130

Demo

The PGS shall be capable of scheduling, generating and delivering NOAA telecommand to the Darmstadt Interface, for transfer in real time to NOAA satellites by EPS ground segment, for NOAA blind orbit cross-support operations. [PSYS-3.1.1-090]

PGSL-3.2.2.1-140

Demo

The PGS shall be capable of acquiring NOAA satellite telecommand-echo, from the Darmstadt Interface, for NOAA blind orbits. [PSYS-3.1.1-105]

PGSL-3.2.2.1-141

Demo

The PGS shall be capable of acquiring NOAA satellite housekeeping telemetry in real time, from the Darmstadt Interface, for NOAA blind orbits. [PSYS-3.1.1-100]

PGSL-3.2.2.1-145

Demo

The PGS shall be capable of generating and transferring to the Suitland Interface, the Metop telecommand echo, in real time throughput mode, for cross-support operations. [PSYS-3.1.1-060]

PGSL-3.2.2.1-150

Demo

The PGS shall be capable of delivering to the Suitland Interface the NOAA-N and then -N' global data at the raw data level, acquired by the PGS CDA stations, in compliance with performance requirements in Section 3.2.2.4. [PSYS-3.1.1-110]

PGSL-3.2.2.1-160

Analysis

The PGS shall be capable of delivering to the Suitland Interface the NOAA-N and then -N' split-mission global or SAIP or STIP data received at the PGS CDA stations per any of the combinations below. [PSYS-3.1.1-110]

- (a) 2 orbits of GAC
- (b) 1 orbit GAC and 1 orbit of SAIP
- (c) orbit GAC and 1 orbit of STIP
- (d) orbits SAIP
- (e) 1 orbit SAIP and 1 orbit of STIP
- (f) 2 orbits STIP

PGSL-3.2.2.1-170

Demo

The PGS shall be capable of delivering to the Darmstadt Interface, via the Communication element, the MHS telemetry data extracted from NOAA satellites global data, in compliance with performance requirements in Section 3.2.2.4. [PSYS-3.1.1-160]

PGSL-3.2.2.1-180

Demo

The PGS shall be capable of acquiring, processing, analyzing and displaying the NOAA instrument telemetry/housekeeping data from the Darmstadt Interface, received from Metop satellites. [PSYS-3.1.1-170]

PGSL-3.2.2.1-190

Demo

The PGS shall complete the delivery of the Metop global data to the Suitland Interface from orbit n before the scheduled acquisition from orbit n+1, in compliance with performance requirements per Section 3.2.2.4. [PSYS-3.1.1-150]

PGSL-3.2.2.1-200

Demo

The PGS shall be capable of delivering to the Darmstadt Interface via a GFT interface the data needed to preprocess NOAA satellite instrument data (e.g. satellite ephemeris or orbital-state, on-board time correlation, instrument calibration parameters). [PSYS-3.1.1-180]

PGSL-3.2.2.1-210

Demo

The PGS shall be capable of acquiring from the EPS, via a GFT interface, the data necessary to preprocess Metop satellite instrument data (e.g. satellite ephemeris or orbital state, on-board time correlation, instrument calibration parameters). [PSYS-3.1.1-190]

PGSL-3.2.2.1-220

Demo

The PGS shall be capable of ingesting and preprocessing, at full resolution, the common core instrument data extracted from the Metop global data, to NOAA Level 1 data sets. [PSYS-3.1.1-200]

PGSL-3.2.2.1-221

Demo

The PGS shall be capable of ingesting and preprocessing the NOAA satellite blind orbit global data acquired from the Darmstadt Interface. [PSYS-3.1.1-140]

PGSL-3.2.2.1-222

Demo

The PGS shall be capable of ingesting and preprocessing to NOAA Level 1 data set the MHS instrument data from the NOAA satellites global data. [PSYS-3.1.1-030]

PGSL-3.2.2.1-230

Demo

The PGS shall be capable of generating Level 2 and 3 products from the common core instrument data extracted from the Metop global data. [PSYS-3.1.1-215]

PGSL-3.2.2.1-231

Demo

The PGS shall be capable of generating Level 2 and 3 products from the NOAA satellite blind orbit global data acquired from the Darmstadt Interface. [PSYS-3.1.1-140]

PGSL-3.2.2.1-235

Demo

The PGS shall be capable of generating Level 2 and 3 products from the MHS instrument data from the NOAA satellites global data. [PSYS-3.1.1-030]

PGSL-3.2.2.1-240

Demo

The PGS shall be capable of ingesting and preprocessing to NOAA Level 1 data set any selectable instrument and telemetry data extracted from MHRPT data, received by the NOAA CDA stations. [PSYS-3.1.1-210]

PGSL-3.2.2.1-245

Demo

The PGS shall be capable of generating Level 2 and 3 products for any selectable instrument and telemetry data extracted from MHRPT data. [PSYS-3.1.1-210]

PGSL-3.2.2.1-250

Demo

The PGS shall be capable of ingesting and processing in pipeline mode, the Metop instrument Level 1 data, acquired from EPS, to meet NOAA user requirements. [PSYS-3.1.1-220]

PGSL-3.2.2.1-260

Demo

The PGS shall be capable of generating Level 2 and 3 products from the Metop Level 1 data received from EPS, to meet NOAA user requirements. [PSYS-3.1.1-220]

PGSL-3.2.2.1-270

Demo

The PGS shall make available to users, the NOAA Level 1b data sets generated from the common instruments extracted from Metop global data, received from EPS. [PSYS-3.1.1-230]

PGSL-3.2.2.1-280

Demo

The PGS shall make available to users, the NOAA Level 1b data sets generated from the Metop satellite global/Level 1 data. [PSYS-3.1.1-230]

PGSL-3.2.2.1-290

Demo

The PGS shall be capable of distributing all NOAA Level 2 and 3 products produced by the PGS, from the Metop satellite global/Level 1 data, to users. [PSYS-3.1.1-230]

PGSL-3.2.2.1-295

Demo

The PGS shall be capable of distributing all NOAA Level 2 and 3 products produced by the PGS, from the common instruments extracted from Metop global data, to users. [PSYS-3.1.1-230]

PGSL-3.2.2.1-300

Demo

The PGS shall archive Metop global/Level 1 data sets and associated databases received from the EPS. [PSYS-3.1.1-240]

PGSL-3.2.2.1-305

Demo

The PGS shall archive common instruments Level 1 data sets and associated databases produced by the IPS element. [PSYS-3.1.1-215]

PGSL-3.2.2.1-310

Demo

The PGS shall archive all supporting databases (ancillary, auxiliary, metadata, etc.) for Metop global /Level 1 data sets. [PSYS-3.1.1-240]

PGSL-3.2.2.1-320

Demo

The PGS shall archive all Levels 2 and 3 products generated by the PGS from: [PSYS-3.1.1-250]

- (a) the common core instruments data on the Metop satellite
- (b) the MHS instrument data
- (c) the Metop instruments data on Metop satellite



(d) the selectable instrument data extracted from the MHRPT

PGSL-3.2.2.1-330

Demo

The PGS shall provide for telecommunications capabilities among the PGS elements to exchange satellite data and information, reliably and in a timely manner as defined by each of the interconnecting elements. [PSYS-3.1.1-020, PSYS-3.1.1-260]

PGSL-3.2.2.1-340

Demot

The PGS shall provide for telecommunications capabilities between the Suitland and Darmstadt Interfaces, for acquiring from Darmstadt the following data types. [PSYS-3.1.1-020, PSYS-3.1.1-270]

- (a) NOAA GAC/SAIP/STIP in pipeline mode
- (b) Metop global data in pipeline mode
- (c) NOAA TIP/AIP/HRPT in throughput mode
- (d) NOAA TC Echo in throughput mode
- (e) Metop instruments Level 1 data sets
- (f) Cross-support and operational planning data

PGSL-3.2.2.1-350

Demo

The PGS shall provide for telecommunications capabilities between the Suitland and Darmstadt Interfaces, for transporting to Darmstadt the following data types: [PSYS-3.1.1-020, PSYS-3.1.1-270]

- (a) NOAA satellite telecommand for NOAA blind orbits and contingency operations in throughput mode
- (b) MHS instrument and telemetry data

PGSL-3.2.2.1-360

Demo

The PGS shall provide telecommunications capabilities among the PGS elements and maintain existing external interfaces including DOD in the IJPS period. [PSYS-3.1.1-020/ PSYS-3.1.1-260]

PGSL-3.2.2.1-370

Demo

The PGS shall provide instrument calibration databases for both the NOAA and Metop satellites to support product generation needs in the IJPS period. [PSYS-3.1.1-280]

PGSL-3.2.2.1-380

Demo

The PGS shall integrate into the PGS any unique EUMESAT provided equipment required to perform commanding, telemetry acquisition and/or data handling of operational Metop satellites. [PSYS-3.1.3-010]

PGSL-3.2.2.1-390

Demo

The PGS shall be capable of recording, playing back, and transferring to the Suitland Interface the NOAA satellite STIP, SAIP, and GAC data. [PSYS-3.1.1-110]

PGSL-3.2.2.1-400

Demo

The PGS shall be capable of recording, playing back, and transferring to the Suitland Interface the GDS data received from Metop satellites. [PSYS-3.1.1-130]

### **3.2.2.2 Operational**

PGSL-3.2.2.2-010

Demo

The PGS shall be capable of supporting IJPS operations upon the successful completion of the System Commissioning Review (SCR) for Metop satellites and On-orbit Verification Review for NOAA satellites. [PSYS-3.1.2-010]

PGSL-3.2.2.2-020

Demo

The PGS shall provide for a rolling archive of 7 days for the NOAA-N and -N' and Metop global data acquired at the CDA stations. [PSYS-3.1.2-030]

PGSL-3.2.2.2-030

Demo

The PGS shall conduct day-to-day operations of NOAA satellites in coordination with the EPS ground segment and support joint tasks, including the cross-support and blind orbit support tasks. [PSYS-3.1.2-020]

PGSL-3.2.2.2-040

Demo

The PGS shall provide for Metop telecommand and telemetry data transporting operations, in a throughput mode, for cross-support of operations in compliance with performance requirements as per 3.2.2.4. [PSYS-3.1.1-060]

PGSL-3.2.2.2-050

Demo

The PGS shall transfer NOAA satellite telecommand to the Darmstadt Interface for NOAA blind orbits. [PSYS-3.1.1-090]

PGSL-3.2.2.2-060

Demo

In the event of GAC data acquisition failure by EPS at the Suitland Interface, the PGS shall make available the backlog GAC or SAIP or STIP data on tapes as requested by the EPS. [PSYS-3.1.1-110]

PGSL-3.2.2.2-070

Demo

In the event of GDS data acquisition failure by EPS at the Suitland Interface, the PGS shall make available the backlog GDS data on tapes as requested by the EPS. [PSYS-3.1.1-130]

PGSL-3.2.2.2-080

Analysis

The PGS shall support the execution of detailed joint plans and procedures with EPS for nominal, contingency and split-mission scenario operations. [PSYS-3.1.2-040]

### 3.2.2.3 Interface

PGSL-3.2.2.3-010

Demo

The PGS shall be capable of interfacing with the EPS Metop satellites for telemetry and data (downlink) and telecommand (uplink), as defined in AD-5. [PSYS-3.1.3-010]

PGSL-3.2.2.3-020

Demo

The PGS shall provide for a single point interface at Suitland, known as the Suitland Interface, in support of data exchange, cross support activities and telecommand operations in compliance with performance requirements in Section 3.2.2.4. [PSYS-3.1.3-030]

PGSL-3.2.2.3-021

Demo

The PGS shall exchange auxiliary and co-ordination data with the EPS via a "Generic File Transfer (GFT)" interface. [PSYS-3.1.1-180, PSYS-3.1.3-040]

PGSL-3.2.2.3-025

Demo

The PGS shall provide a voice loop for exchange of operational coordination with the EPS ground segment. [PSYS-3.1.3-035]

PGSL-3.2.2.3-030

Demo

The PGS shall make available to EPS at the Suitland Interface, the following data types, in compliance with the performance requirements. [PSYS-3.1.1-110]

- (a) NOAA GAC data from NOAA-N and -N' acquired by the NOAA CDA station. (If GAC is unavailable, then Stored AIP (SAIP) or Stored TIP (STIP) data.).
- (b) Metop GDS data acquired by the NOAA CDA station for EPS blind orbits.
- (c) Metop telemetry data acquired by the NOAA CDA station for EPS blind orbits.
- (d) NOAA satellite and instruments auxiliary and coordination data.
- (e) Metop telecommand echo upon successful transmission of the EPS generated satellite command, by the Fairbanks CDA station.

PGSL-3.2.2.3-031

Analysis

The PGS shall provide the following backlog data tapes (Standard TBD) as appropriate to EPS, in the event of communications failure between NOAA and EPS: [PSYS-3.1.1-110, PSYS-3.1.1-130]

- (a) Backlog GAC or SAIP or STIP data
- (b) Backlog GDS

PGSL-3.2.2.3-035

Demo

The PGS shall provide a data buffering capacity at the Suitland Interface, for data acquired from Fairbanks CDA, to contain at all times a minimum of one complete download of NOAA GAC or SAIP or STIP and one complete download of GDS data. [PSYS-3.1.3-030]

PGSL-3.2.2.3-040

Demo

The PGS shall be capable of receiving at the Suitland Interface the Metop telecommand data delivered by EPS ground segment, and transfer it to the Fairbanks CDA station in compliance with performance requirements, Section 3.2.2.4. [PSYS-3.1.1-060, PSYS-3.1.3-030]

PGSL-3.2.2.3-050

Demo

The PGS shall be operationally compatible to exchange data/information with the Darmstadt Interface at the EPS ground segment. [PSYS-3.1.3-040]

PGSL-3.2.2.3-060

Demo

The PGS shall acquire from the Darmstadt Interface the following data types, made available by the EPS. [PSYS-3.1.1-050, PSYS-3.1.1-140, PSYS-3.1.1-105, PSYS-3.1.3-040]

- (a) GAC data from NOAA-N and -N' satellites received by the EPS PCDA station. (If GAC is unavailable, then Stored AIP (SAIP) or Stored TIP (STIP) data.)
- (b) Metop GDS data acquired by the EPS PCDA station.
- (c) NOAA TIP/AIP/HRPT real time data acquired by the EPS PCDA station.
- (d) Metop instrument Level 1 data sets made available by EPS.
- (e) Metop satellite and instruments auxiliary and coordination data as defined in AD-4.
- (f) NOAA telecommand echo upon successful transmission, by the EPS PCDA station, of the NOAA generated satellite command.

PGSL-3.2.2.3-061

Analysis

The PGS shall acquire the following backlog data tapes (Standard TBD) as appropriate from EPS, in the event of communications failure between NOAA and EPS: [PSYS-3.1.1-110, PSYS-3.1.1-130]

- (a) Backlog GAC or SAIP or STIP data
- (b) Backlog Metop GDS data

PGSL-3.2.2.3-065

Demo

The PGS shall provide a data buffering capacity for data acquired from Darmstadt Interface, to contain a minimum of one complete download of NOAA GAC or SAIP or STIP data and one complete download of GDS data, at all times. [PSYS-3.1.3-030]

PGSL-3.2.2.3-070

Demo

The PGS shall be capable of delivering to the Darmstadt Interface the NOAA telecommand for uplink to the NOAA satellite through the EPS ground segment. [PSYS-3.1.1-090]

PGSL-3.2.2.3-080

Demo

The PGS shall interface with the EPS for the reception of decryption keys for Metop LRPT/HRPT. [PSYS-3.1.3-020, PSYS-3.1.3-040]

PGSL-3.2.2.3-090

Demo

The PGS shall provide/maintain an interface for NOAA user community to access and retrieve short-term and long-term stored/archived data/products from both NOAA and Metop satellites in the IJPS period. [PSYS-3.1.3-050]

PGSL-3.2.2.3-100

Demo

The PGS shall provide/maintain an interface for the distribution of the NOAA global data, to users and the Department of Defense in the IJPS period. [PSYS-3.1.3-050]

PGSL-3.2.2.3-110

Demo

The PGS shall provide/maintain an interface for the distribution of the common core instrument data extracted from Metop global data, to users and the Department of Defense in the IJPS period. [PSYS-3.1.3-060]

PGSL-3.2.2.3-120

Demo

The PGS shall be capable of interfacing with any unique EPS provided equipment required for performing commanding, telemetry acquisition or data handling for Metop satellites. [PSYS-3.1.3-010]

### 3.2.2.4 Performance

PGSL-3.2.2.4-010

Analysis

The PGS shall be capable of supporting the launch of a new POES within 120 days of notification. [PSYS-3.1.4-010]

PGSL-3.2.2.4-020

Analysis

The PGS shall provide for an overall system availability of at least 97.5% calculated on an annualized basis. [PSYS-3.1.4-020]

PGSL-3.2.2.4-030

Test

The PGS shall provide the NOAA GAC or SAIP or STIP data at the Suitland Interface for EUMETSAT to retrieve, as defined below: [PSYS-3.1.4-020]

- (a) In a time ordered manner (first data in is transmitted first)
- (b) As received without any processing
- (c) First data no later than 2 minutes after loss of signal
- (d) Last data no later than 100 minutes after download completion
- (e) Data available in a pipeline mode

PGSL-3.2.2.4-040

Test

The PGS shall provide the Metop blind orbit global data at the Suitland Interface for EUMETSAT to retrieve, as defined below: [PSYS-3.1.4-020, PSYS-3.1.1-130]

- (a) In a time ordered manner (first data in is transmitted first)
- (b) Reed-Solomon error decoded and quality flag appended
- (c) Data in the VCDU format
- (d) UTC time stamp appended

- (e) First data no later than 2 minutes after download completion
- (f) Last data no later than 100 minutes after download completion
- (g) Data available in a pipeline mode

PGSL-3.2.2.4-050

Analysis

The PGS shall deliver 98.8% of the NOAA GAC or SAIP or STIP data acquired to the Suitland Interface, measured over any 30-day period. [PSYS-3.1.4-020]

PGSL-3.2.2.4-060

Analysis

The PGS shall deliver 98.8% of the Metop global data acquired to the Suitland Interface, measured over any 30-day period. [PSYS-3.1.4-020]

PGSL-3.2.2.4-070

Test

The PGS shall deliver the Metop blind orbit telemetry (TM) data to the Suitland Interface as defined below: [PSYS-3.1.4-020]

- (a) Data available in a throughput mode
- (b) UTC time stamp appended, with accuracy better than 100 micro-sec. (TBC) and format to conform to the EPS Product Conventions Document [EPS/SYS/TEN/990007]
- (c) NOAA shall not alter the content of the TM frames
- (d) Ensure that 98.8% of TM Downlink successfully transferred over a 30-day period
- (e) The delay between the TM Frame complete acquisition and its availability at the interface shall be less than 1 second
- (f) Maximum downtime of the TM transport chain between the CDA station and the interface shall not exceed 100 minutes
- (g) Interface shall be compatible with EPS CGS common TM/TC interface standard (TBD)

PGSL-3.2.2.4-080

Analysis

The PGS shall not exceed a 360 minutes maximum downtime limit for the NOAA CDA station to the Suitland Interface data delivery chain in a 30-day period. [PSYS-3.1.4-020]

PGSL-3.2.2.4-090

Analysis, Test

The PGS maximum command transport chain downtime from the Suitland Interface to the CDA station shall not exceed 100 minutes in a 30-day period. [PSYS-3.1.4-020]

PGSL-3.2.2.4-100

Demo

The PGS shall be capable of delivering to the Darmstadt Interface, the MHS telemetry data extracted from NOAA satellites global data, via the communication element as defined below. [PSYS-3.1.4-020]

- (a) Transfer in throughput mode
- (b) Data format as extracted from the satellite data

PGSL-3.2.2.4-110

Analysis

The PGS shall complete product processing of any selectable instrument and telemetry data extracted from MHRPT received at a PGS CDA station, and deliver products to users in less than 30 minutes from observation. [PSYS-3.1.4-030]

### 3.3 PGS Element Requirements

The requirement ID structure format is the same as described in Section 3, except as noted below.

For **CDA Element Requirements**, the requirement ID is in the form:  
PCDAS, <a.b.c.d.>-<number>”, followed by text paragraph(s).

For Satellite Operation Control Element Requirements, the requirement ID is in the form:  
PSOC, <a.b.c.d.>-<number>”, followed by text paragraph(s).

For Ingest and Preprocessing System Element Requirements, the requirement ID is in the form:  
PIPS, <a.b.c.d.>-<number>”, followed by text paragraph(s).

For Product Generation & Distribution Systems Element Requirements, the requirement ID is in the form:  
PPGD, <a.b.c.d.>-<number>”, followed by text paragraph(s).

For Data Access & Archive System Element Requirements, the requirement ID is in the form:  
PDAA, <a.b.c.d.>-<number>”, followed by text paragraph(s).

For **Communications Element Requirements**, the requirement ID is in the form:  
PCOM, <a.b.c.d.>-<number>”, followed by text paragraph(s).

#### 3.3.1 Command and Data Acquisition Element Requirements

As previously stated, requirements applicable to the areas of Quality Control Standards, Maintainability, Training and Logistics are not specifically mentioned in this document based on the understanding that each element of the POES System is an operational entity and hence shall adopt their existing practice in these areas.

##### 3.3.1.1 Functional

PCDAS-3.3.1.1-010

Inspection

The CDA shall include one primary (Fairbanks) and at least one other physically separate back up CDA station. [PGSL-3.2.2.1-020]

PCDAS-3.3.1.1-020

Demo

The Fairbanks CDA shall be capable of receiving Metop satellite global and telemetry data in support of the IJPS mission as scheduled by the SOCC and as defined in AD-5. [PGSL-3.2.2.1-010, PGSL-3.2.2.1-090, PGSL-3.2.2.1-115]

PCDAS-3.3.1.1-025

Demo

Each CDA shall be capable of receiving the Metop satellite MHRPT data in real time as scheduled by the SOCC and as defined in AD-5. [PGSL-3.2.2.1-115, PGSL-3.2.2.4-110]

PCDAS-3.3.1.1-030

Demo

Each CDA shall be capable of processing/extracting and then transferring, any selectable instrument and satellite housekeeping VCDUs from the MHRPT, to the IPS element via the communication element, as scheduled by the SOCC. [PGSL-3.2.2.1-116, PGSL-3.2.2.4-110]

PCDAS-3.3.1.1-040

Demo

The Fairbanks CDA shall be capable of receiving Metop telecommand data in a throughput mode, via the communications element, from the Suitland Interface. [PGSL-3.2.2.1-080]

PCDAS-3.3.1.1-050

Demo

As scheduled by the SOCC and defined in AD-5, the Fairbanks CDA shall be capable of transmitting "uplink" commands to the EPS Metop satellites without any alterations of the content and in compliance with the performance requirement in Sec. 3.3.1.4. [PGSL-3.2.2.1-080]

PCDAS-3.3.1.1-060

Demo

The Fairbanks CDA shall process (error decode and time stamp) the Metop satellite global data. [PGSL-3.2.2.1-100, PGSL-3.2.2.4-040]

PCDAS-3.3.1.1-070

Demo

The Fairbanks CDA shall process (error decode and time stamp) the Metop satellite housekeeping telemetry data. [PGSL-3.2.2.1-100]

PCDAS-3.3.1.1-080

Analysis

The Fairbanks CDA shall be capable of providing blind orbit cross-support to one operational EPS satellite at a time. Additional requests shall be accommodated within the sizing of the system. [PGSL-3.2.2.1-120]

PCDAS-3.3.1.1-090

Demo

For cross-support operations, the Fairbanks CDA shall be capable of generating and transferring the Metop telecommand echo, in throughput mode, to the Suitland Interface via the Communication element. [PGSL-3.2.2.1-145]

PCDAS-3.3.1.1-100

RESERVED

PCDAS-3.3.1.1-110

Analysis

As scheduled by SOCC, the CDA shall be capable of supporting the NOAA-N & then -N' split-mission global or SAIP or STIP data acquisition and transferring it to the Suitland Interface, and the CDA shall support any of the combinations below. [PGSL-3.2.2.1-160]

- (a) 2 orbits of GAC
- (b) 1 orbit GAC and 1 orbit of SAIP
- (c) 1 orbit GAC and 1 orbit of STIP
- (d) 2 orbits SAIP
- (e) 1 orbit SAIP and 1 orbit of STIP
- (f) 2 orbits STIP



PCDAS-3.3.1.1-120

Demo

The Fairbanks CDA shall be capable of transferring the global data from one operational Metop satellite for orbit n to the Suitland interface, via the communication element, before the CDA station starts acquisition of data from orbit n+1. [PGSL-3.2.2.1-190]

PCDAS-3.3.1.1-130

Demo

The Fairbanks CDA shall be capable of recording, playing back and transferring to the Suitland Interface, the NOAA satellite STIP, SAIP, and GAC data, via the Communication element in compliance with performance requirement. [PGSL-3.2.2.1-390]

PCDAS-3.3.1.1-140

Demo

The Fairbanks CDA shall be capable of recording, playing back and transferring to the Suitland Interface, via the Communication element, the GDS data received from Metop satellites in compliance with performance requirement. [PGSL-3.2.2.1-400]

PCDAS-3.3.1.1-150

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**3.3.1.2 Operational**

PCDAS-3.3.1.2-010

Demo

The CDA shall be capable of supporting IJPS operations upon the successful completion of the System Commissioning Review (SCR) for Metop satellites and On-orbit Verification Review for NOAA satellites. [PGSL-3.2.2.2-010]

PCDAS-3.3.1.2-020

Demo

The Fairbanks CDA shall be capable of executing day to day operations with one operational EPS satellite at a time, including cross-support and blind orbit support tasks, as scheduled by SOCC. [PGSL-3.2.2.2-030]

PCDAS-3.3.1.2-030

Demo

In the event of data acquisition failure at the Suitland Interface, the CDA shall make available the backlog GAC or SAIP or STIP data at the Suitland Interface or on tapes, as requested and scheduled by SOCC. [PGSL-3.2.2.2-060]

PCDAS-3.3.1.2-040

Demo

In the event of data communication acquisition failure at the Suitland Interface, the CDA shall make available the backlog GDS data at the Suitland Interface or on tapes, as requested and scheduled by SOCC. [PGSL-3.2.2.2-070]

**3.3.1.3 Interface**

PCDAS-3.3.1.3-010

Demo

The CDA shall interface with the EPS Metop-1 and Metop-2 satellites for uplink and downlink communications as defined in AD-5. [PGSL-3.2.2.3-010]

PCDAS-3.3.1.3-020

Demo

The Fairbanks CDA shall integrate and interface with any unique EUMETSAT provided equipment required for performing commanding, telemetry acquisition or data handling for Metop satellites. [PGSL-3.2.2.1-380]

PCDAS-3.3.1.3-030

Demo

The CDA shall be capable of interfacing with the Communication element for transferring and receiving all types of data and information, to and from, other PGS elements. [PGSL-3.2.2.3-010]

PCDAS-3.3.1.3-040

Demo

The Fairbanks CDA shall transfer to the Suitland interface, via the Communications element, the following data types, in compliance with performance requirements (Sec.3.3.1.4). [PGSL-3.2.2.3-030]

- (a) NOAA-N and -N' GAC or SAIP or STIP for each orbit.
- (b) NOAA HRPT
- (c) Metop global data acquired for EPS blind orbit support.
- (d) Metop satellite housekeeping telemetry data acquired for EPS blind orbits.
- (e) Extracted selectable instrument and telemetry data from the Metop HRPT data
- (f) Metop telecommand echo upon successful transmission of the EPS generated satellite command, by the Fairbanks CDA station.

**3.3.1.4 Performance**

PCDAS-3.3.1.4-010

Demo

The CDA shall be capable of supporting the launch of a new POES within 120 days of notification. [PGSL-3.2.2.4-010]

PCDAS-3.3.1.4-020

Demo

Each CDA station shall provide the capability for a seven (7) day rolling archive of the global data from both NOAA and Metop satellites, acquired at that station. [PGSL-3.2.2.2-020]

PCDAS-3.3.1.4-030

Analysis

The CDA availability, for any single satellite data downlink, shall be 99.4% over any 30-day period. [PGSL-3.2.2.4-020]

PCDAS-3.3.1.4-040

Analysis

The CDA data availability for any satellite uplink data type shall be 99.6% over any 30-day period. [PGSL-3.2.2.4-030, PGSL-3.2.2.4-050]

PCDAS-3.3.1.4-050

Analysis

The CDA maximum downtime for GAC or GDS data shall never exceed 360 minutes in a 30-day period. [PGSL-3.2.2.4-080]

PCDAS-3.3.1.4-060

Demo

The CDA maximum downtime for Metop telecommand data shall never exceed 100 minutes in a 30-day period. [PGSL-3.2.2.4-090]

PCDAS-3.3.1.4-070

Test

The CDA shall transfer the Metop blind orbit telemetry (TM) data to the Suitland Interface, via the communications link, as defined below: [PGSL-3.2.2.4-070, PGSL-3.2.2.4-060]

- (a) Data available in a throughput mode
- (b) UTC time stamp appended, with accuracy better than 100 micro-secs. (TBC) and format to conform to the EPS Product Conventions Document [EPS/SYS/TEN/990007]
- (c) NOAA shall not alter the content of the TM frames
- (d) Ensure that 99.4% of TM Downlink successfully transferred over any 30-day period
- (e) The delay between the TM Frame complete acquisition and its availability at the CDA communication interface shall be less than 350 millisecond
- (f) Maximum downtime of the TM transport chain between the CDA station and the Suitland Interface shall not exceed 100 minutes
- (g) The CDA Interface shall comply with EPS CGS common TM/TC interface standard (TBD)

PCDAS-3.3.1.4-080

Test

The Fairbanks CDA shall transfer to the Suitland Interface the global data acquired from Metop satellites, via the communication element per criteria below. [PGSL-3.2.2.1-100, PGSL-3.2.2.1-110, PGSL-3.2.2.4-040, PGSL-3.2.2.4-070]

- (a) In the Virtual Channel Data Unit format (VCDU)
- (b) Reed-Solomon error decoded and quality flags appended
- (c) UTC time stamp appended, with accuracy better than 100 micro-secs. (TBC) and format to conform to the EPS Product Conventions Document [EPS/SYS/TEN/990007]
- (d) Data made available at the Suitland Interface, should be compatible for acquiring by EPS ground segment in pipeline mode
- (e) Last Metop GDS data shall be made available at the Suitland Interface not later than 100 minutes after data downlink completion as coordinated by SOCC.
- (f) The first GDS data shall be made available at the Suitland Interface not later than 2 minutes after the completion of the data downlink as coordinated by SOCC.
- (g) Ensure that 99.4% of GDS data acquired is successfully transferred to the Suitland Interface in any 30-day period.

PCDAS-3.3.1.4-090

Test

Each CDA shall transfer to the Suitland Interface the NOAA GAC or SAIP or STIP data acquired from NOAA satellites, via the communication element per criteria below. [PGSL-3.2.2.4-030, PGSL-3.2.2.4-050]

- (a) In the time ordered manner (data sensed first shall be transferred first)
- (b) Without any modification (no time stamp or quality indicator)
- (c) Data made available at interface, should be compatible for acquiring by EPS ground segment in pipeline mode

- (d) The last GAC or SAIP or STIP data shall be made available at the Suitland Interface not later than 100 minutes after data downlink completion as coordinated by SOCC.
- (e) The first GAC or SAIP or STIP data shall be made available at the Suitland Interface not later than 2 minutes after the loss of signal as coordinated by SOCC.
- (f) Ensure that 99.4% of GAC or SAIP or STIP data acquired is successfully transferred to the Suitland Interface in a 30-day period

PCDAS-3.3.1.4-100

Demo

The delay between a complete Metop TC reception at the Suitland Interface and its Uplink/transmission at the Fairbanks CDA station shall be less than 1 second. [PGSL-3.2.2.1-080, PGSL-3.2.2.3-040]

### **3.3.2 Satellite Control and Operations (SOCC) Element Requirements**

As previously stated, requirements applicable to the areas of Quality Control Standards, Maintainability, Training and Logistics are not specifically mentioned in this document based on the understanding that each element of the POES System is an operational entity and hence shall adopt their existing practice in these areas.

#### **3.3.2.1 Functional**

PSOC-3.3.2.1-010

Demo

The SOCC shall be capable of scheduling and controlling the overall PGS communications routing functions in support of receiving, processing, exchanging data/information, and recording of satellite data and telemetry in support of the IJPS mission. [PGSL-3.2.2.1-010, PGSL-3.2.2.1-100, PGSL-3.2.2.1-115, PGSL-3.2.2.1-116, PGSL-3.2.2.1-170]

PSOC-3.3.2.1-020

Demo

The SOCC shall be capable of scheduling and controlling the PGS communications routing functions in support of transferring the NOAA satellite telecommand to the Darmstadt Interface. [PGSL-3.2.2.1-130, PGSL-3.2.2.1-145]

PSOC-3.3.2.1-025

Inspection

In the event the SOCC is unavailable to support the IJPS mission, corresponding SOCC functions (TBD) shall be supported at a physically separate backup satellite control center. [PGSL-3.2.2.1-030]

PSOC-3.3.2.1-030

Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of acquiring Metop global data and information from the Darmstadt Interface via the communication element. [PGSL-3.2.2.1-050]

PSOC-3.3.2.1-040

Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of acquiring and transferring the NOAA blind orbit global data from the Darmstadt Interface via the communication element. [PGSL-3.2.2.1-060, PGSL-3.2.2.1-070, PGSL-3.2.2.1-180]

PSOC-3.3.2.1-050

Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of transferring the EPS satellite telecommand, from the Suitland Interface, in a throughput mode, to the Fairbanks CDA for uplink. [PGSL-3.2.2.1-080]

PSOC-3.3.2.1-060

Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of acquiring the operational EPS satellite global and Telemetry (TM) data by the Fairbanks CDA station in compliance with AD-5. [PGSL-3.2.2.1-090]

PSOC-3.3.2.1-070

Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of transferring to the Suitland Interface the global data acquired from the EPS satellites by the Fairbanks CDA station, in compliance with performance requirements (Sec.3.3.2.4). [PGSL-3.2.2.1-090, PGSL-3.2.2.1-100, PGSL-3.2.2.1-110, PGSL-3.2.2.1-115]

PSOC-3.3.2.1-071

Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of transferring to the IPS Element the MHRPT data, acquired from EPS satellites by either PGS CDA stations, in compliance with performance requirements (Sec.3.3.2.4). [PGSL-3.2.2.1-090, PGSL-3.2.2.1-100, PGSL-3.2.2.1-110, PGSL-3.2.2.1-115]

PSOC-3.3.2.1-080

Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of receiving the global and housekeeping telemetry data from one operational EPS satellite at a time, for EPS cross support. [PGSL-3.2.2.1-090]

PSOC-3.3.2.1-090

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PSOC-3.3.2.1-091

Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of transferring the Metop satellite housekeeping telemetry data in throughput mode, to the Suitland Interface via the Communications element. [PGSL-3.2.2.1-110, PGSL-3.2.2.4-070]

PSOC-3.3.2.1-100

Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of receiving the real time satellite MHRPT data from one operational satellite by either PGS CDA stations. [PGSL-3.2.2.1-115]

PSOC-3.3.2.1-110

Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of delivering any selectable instrument data and Metop satellite housekeeping data, extracted from MHRPT data, to the IPS element via the Communications element. [PGSL-3.2.2.1-115, PGSL-3.2.2.1-116]

PSOC-3.3.2.1-120

Demo

The SOCC shall be capable of providing Metop blind orbit cross-support to one operational EPS satellite with additional requests to be accommodated within the capability of the system, as defined in AD-3. [PGSL-3.2.2.1-120]

PSOC-3.3.2.1-130

Demo

The SOCC shall be capable of scheduling; then generating and forwarding NOAA telecommands in real time to the Darmstadt Interface, for NOAA satellite blind orbits. [PGSL-3.2.2.1-130, PGSL-3.2.2.3-070]

PSOC-3.3.2.1-140

Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of acquiring and processing the NOAA satellite telecommand-echo from Darmstadt Interface. [PGSL-3.2.2.1-140]

PSOC-3.3.2.1-150

Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of acquiring and processing the housekeeping telemetry data from the Darmstadt Interface, for NOAA satellite blind-orbits and cross-support operations. [PGSL-3.2.2.1-141]

PSOC-3.3.2.1-160

Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of delivering to the Suitland Interface, the NOAA-N and -N' global or SAIP or STIP data received at the PGS CDA stations in compliance with performance requirements in Section 3.3.2.4. [PGSL-3.2.2.1-150]

PSOC-3.3.2.1-170

Analysis

The SOCC shall be capable of scheduling and controlling PGS functions in support of delivering to the Suitland Interface, the NOAA-N and -N' split-mission global or SAIP or STIP data received at the PGS CDA stations per any of the combinations below. [PGSL-3.2.2.1-160]

- (a) 2 orbits of GAC
- (b) 1 orbit GAC and 1 orbit of SAIP
- (c) 1 orbit GAC and 1 orbit of STIP
- (d) 2 orbits SAIP
- (e) 1 orbit SAIP and 1 orbit of STIP
- (f) 2 orbits STIP

PSOC-3.3.2.1-180

Demo

The SOCC shall be capable of extracting the MHS telemetry data from NOAA satellites global data, and deliver it to the Darmstadt Interface, via the Communication element. [PGSL-3.2.2.1-170, PGSL-3.2.2.4-100]

PSOC-3.3.2.1-190

Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of delivering to the Darmstadt Interface, the MHS telemetry data extracted from NOAA satellites. [PGSL-3.2.2.1-170, PGSL-3.2.2.4-100]

PSOC-3.3.2.1-200

Demo

The SOCC shall be capable of acquiring, via the Communication element, the NOAA instrument housekeeping data from the Darmstadt Interface, acquired from Metop satellites. [PGSL-3.2.2.1-180]

PSOC-3.3.2.1-205

Demo

The SOCC shall be capable of processing, analyzing and displaying the NOAA instrument housekeeping data acquired from the Darmstadt Interface. [PGSL-3.2.2.1-180]

PSOC-3.3.2.1-210

Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of completing the delivery to the Suitland Interface the global data from orbit n before the acquisition from orbit n+1. [PGSL-3.2.2.1-190]

PSOC-3.3.2.1-220

Demo

The SOCC shall provide a data buffering capacity at the Suitland Interface, for data acquired from Fairbanks CDA, to contain a minimum of one complete download of NOAA GAC or SAIP or STIP and one complete download of GDS data, at all times. [PGSL-3.2.2.3-035]

### **3.3.2.2 Operational**

PSOC-3.3.2.2-010

Demo

The SOCC shall be capable of supporting IJPS operations upon the successful completion of the System Commissioning Review (SCR) for Metop satellites and On-orbit Verification Review for NOAA satellites. [PGSL-3.2.2.2-010]

PSOC-3.3.2.2-020

Demo

The SOCC shall command, monitor/identify the health and safety, and trouble-shoot the NOAA satellites, including all the instruments they carry regardless of their origin, in the IJPS period. [PGSL-3.2.2.2-030]

PSOC-3.3.2.2-030

Demo

In support of anomalous and emergency situations, the SOCC shall receive and display telemetry data, acquired from the Darmstadt interface, for the NOAA instruments on-board Metop satellites. [PGSL-3.2.2.2-030]

PSOC-3.3.2.2-040

Demo

The SOCC shall coordinate all PGS support functions with the EPS for data and information exchange, the day-to-day satellite operations, and cross-support activities. [PGSL-3.2.2.3-030, PGSL-3.2.2.3-040, PGSL-3.2.2.3-080]

PSOC-3.3.2.2-050

Demo

The SOCC shall schedule, control and maintain all NOAA data buffering and distribution operations allocated to SOCC. [PGSL-3.2.2.3-035, PGSL-3.2.2.3-065]

PSOC-3.3.2.2-060

Demo

The SOCC shall schedule and control PGS operations with the EPS ground segment, for cross-support telecommand and telemetry data transfers per performance requirements in Section 3.3.2.4. [PGSL-3.2.2.2-030, PGSL-3.2.2.3-080]

PSOC-3.3.2.2-070

Demo

The SOCC shall schedule and coordinate all NOAA System activities in the event of data acquisition/transmission failures at either Suitland or Darmstadt interface. [PGSL-3.2.2.2-060]

PSOC-3.3.2.2-080

Demo

In the event of transmission failure at either the Suitland or the Darmstadt interface, the SOCC shall coordinate backlog data supply/acquire operations with the EPS ground segment. [PGSL-3.2.2.2-060, PGSL-3.2.2.2-070]

PGSL-3.3.2.2-090

Analysis

The SOCC shall support the execution of detailed joint plans and procedures with EPS, for nominal, contingency and split-mission scenario operations. [PGSL-3.2.2.2-080]

PSOC-3.3.2.2-100

Demo

The SOCC shall monitor the Suitland Interface operational performance. [PGSL-3.2.2.3-020]

PSOC-3.3.2.2 –110

Demo

The SOCC shall transfer the Metop TC in a throughput mode from the Suitland Interface to Fairbanks CDA station per performance requirement in Section 3.3.2.4. [PGSL-3.2.2.4-070]

### **3.3.2.3 Interface**

PSOC-3.3.2.3-010

Demo

The SOCC shall monitor and control the NOAA "Generic File Transfer (GFT)" Interface operations. [PGSL-3.2.2.3-021]

PSOC-3.3.2.3-020

Demo

The SOCC shall be capable of establishing a voice loop with the EPS. [PGSL-3.2.2.3-025]

PSOC-3.3.2.3-030

Demo

The SOCC shall interface with the Communications element to receive and transmit data and information to other PGS Elements and the EPS. [PGSL-3.2.2.3-020]

### **3.3.2.4 Performance**

PSOC-3.3.2.4-010

Analysis

The SOCC shall be capable of supporting the launch of a POES within 120 days of notification. [PGSL-3.2.2.4-010]



PSOC-3.3.2.4-020

Analysis

The SOCC maximum downtime for GAC or GDS data transfer capability shall never exceed 360 minutes. [PGSL-3.2.2.4-080]

PSOC-3.3.2.4-030

Analysis

The SOCC maximum downtime for Metop telecommand data transfer capability shall not exceed 100 minutes. [PGSL-3.2.2.4-090]

PSOC-3.3.2.4-031

Analysis

The SOCC maximum downtime for Metop TM transfer capability shall not exceed 100 minutes. [PGSL-3.2.2.4-090]

PSOC-3.3.2.4-040

Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of transferring to the Suitland Interface the NOAA-N & then -N' global or SAIP or STIP and HRPT data received at the PGS CDA stations as defined below: [PGSL-3.2.2.4-030]

- (a) In the time ordered manner (data sensed first shall be transferred first)
- (b) Without any modification (no time stamp or quality indicator)
- (c) Data made available at Suitland Interface, should be compatible for acquiring by EPS ground segment in pipeline mode
- (d) The last GAC or SAIP or STIP data shall be made available at the Suitland Interface not later than 100 minutes after data downlink completion.
- (e) The first GAC or SAIP or STIP data shall be made available at the Suitland Interface not later than 2 minutes after the loss of signal.
- (f) Ensure that 99.4% of GAC or SAIP or STIP data acquired is transferred successfully to the Suitland Interface in any 30-day period.

PSOC-3.3.2.4-050

Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of transferring to the Suitland Interface, the Metop blind orbit global data received at the PGS CDA station as defined below: [PGSL-3.2.2.4-040]

- (a) In the Virtual Channel Data Unit format (VCDU)
- (b) Reed-Solomon error decoded and quality flags appended
- (c) UTC time stamp appended, with accuracy better than 100 micro-secs. (TBC) and format to conform to the EPS Product Conventions Document [EPS/SYS/TEN/990007]
- (d) Data made available at Suitland Interface, should be compatible for acquiring by EPS ground segment in pipeline mode
- (e) Last Metop GDS data shall be made available at the Suitland Interface not later than 100 minutes after data downlink completion.
- (f) The first GDS data shall be made available at the Suitland Interface not later than 2 minutes after the completion of the data downlink.
- (g) Ensure that 99.4% of GDS data acquired is successfully transferred to the interface in any 30-day period

PSOC-3.3.2.4-051

Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of transferring to the IPS Element, the MHRPT data received at both PGS CDA stations as defined below: [PGSL-3.2.2.4-040]

- (a) In the Virtual Channel Data Unit format (VCDU)
- (b) Reed-Solomon error decoded and quality flags appended
- (c) Viterbi decoded
- (d) Ensure that 99.4% of GDS data acquired is successfully transferred to the interface in any 30-day period

PSOC-3.3.2.4-060

Demo

The SOCC shall be capable of scheduling and controlling PGS functions in support of transferring to the Suitland Interface the Metop blind orbit telemetry (TM) data received at the PGS CDA stations as defined below: [PGSL-3.2.2.4-070]

- (a) In the Virtual Channel Data Unit format (VCDU)
- (b) UTC time stamp appended, with accuracy better than 100 micro-secs. (TBC) and format to conform to the EPS Product Conventions Document [EPS/SYS/TEN/990007]
- (c) Data made available at the Suitland Interface, should be compatible for acquiring by EPS ground segment in throughput mode
- (d) Ensure that 98.8% of TM data acquired is successfully transferred to the interface in any 30-day period

PSOC-3.3.2.4-070

Demo

The delay, between a complete Metop telecommand data reception at the Suitland Interface and its Uplink/transmission at the Fairbanks CDA station, shall be less than 1 second. [PGSL-3.2.2.1-080, PGSL-3.2.2.3-040]

### 3.3.3 Ingest and Preprocessing System (IPS) Element Requirements

As previously stated, requirements applicable to the areas of Quality Control Standards, Maintainability, Training and Logistics are not specifically mentioned in this document based on the understanding that each element of the POES System is an operational entity and hence shall adopt their existing practice in these areas.

#### 3.3.3.1 Functional

PIPS-3.3.3.1-010

Demo

The IPS shall be capable of receiving the Metop global data in the CCSDS VCDU format and in a pipeline mode from the Darmstadt Interface, via the Communication element. [PGSL-3.2.2.1-010, PGSL-3.2.2.1-116, PGSL-3.2.2.1-240]

PIPS-3.3.3.1-020

Demo

The IPS shall be capable of receiving the NOAA satellites' blind orbit global data in a pipeline mode, from the Suitland Interface via the communication element. [PGSL-3.2.2.1-221]

PIPS-3.3.3.1-030

Demo

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PIPS-3.3.3.1-040

Demo

The IPS shall ingest the common instruments' data extracted from the Metop satellite global data. [PGSL-3.2.2.1-220]

PIPS-3.3.3.1-050

Demo

The IPS shall be capable of ingesting the NOAA satellite blind orbit global data in a pipeline mode. [PGSL-3.2.2.1-221, PGSL-3.2.2.1-222]

PIPS-3.3.3.1-051

Demo

The IPS shall provide the NOAA blind orbit and Metop satellite preprocessed data to product generation and access and archive elements. [PGSL-3.2.2.1-370]

PIPS-3.3.3.1-055

Demo

The IPS shall provide instrument calibration databases for both the NOAA and Metop satellites to support product generation needs in the IJPS period. [PGSL-3.2.2.1-370]

PIPS-3.3.3.1-060

Demo

The IPS shall be capable of receiving and ingesting any selectable instrument and housekeeping telemetry data extracted from the MHRPT data, in the CCSDS VCDU format per performance requirement in Section 3.3.3.4. [PGSL-3.2.2.1-240, PGSL-3.2.2.4-110]

PIPS-3.3.3.1-070

Demo

The IPS shall preprocess the common instruments data extracted from Metop global data to NOAA Level 1b data sets (for AVHRR full and reduced resolutions). [PGSL-3.2.2.1-220]

PIPS-3.3.3.1-080

Demo

The IPS shall preprocess the NOAA blind orbit data, received from Darmstadt Interface via the Communications Element and SOCC, to NOAA Level 1b data sets. [PGSL-3.2.2.1-221, PGSL-3.2.2.1-222]

PIPS-3.3.3.1-090

Demo

The IPS shall be capable of preprocessing any selectable instrument data (full and reduced resolutions) extracted from MHRPT data to NOAA Level 1b data sets. [PGSL-3.2.2.1-240]

PIPS-3.3.3.1-100

Demo

The IPS shall be capable of receiving and ingesting the Metop instrument Level 1 data acquired from EPS, as requested by the NOAA user community. [PGSL-3.2.2.1-250]

### 3.3.3.2 Operational

PIPS-3.3.3.2-010

Demo

The IPS shall support IJPS operations upon the successful completion of the System Commissioning Review (SCR) for Metop satellites and On-orbit Verification Review for NOAA satellites. [PGSL-3.2.2.2-010]

PIPS-3.3.3.2-020

Demo

The IPS shall coordinate with SOCC for data/information exchanges including backlog tapes, cross-support activities and contingency operations, related to EPS ground segment. [PGSL-3.2.2.2-030]

PIPS-3.3.3.2-030

Demo

The IPS shall communicate with the EPS ground segment via a GFT Interface to exchange respective auxiliary and coordination data/information as listed below [PGSL-3.2.2.1-200, PGSL-3.2.2.3-060]:

- (a) Satellite orbit state vector update (orbit prediction over the next 24 hours)
- (b) Satellite OBT/UTC time correlation updates
- (c) Instrument calibration parameters updates
- (d) Others per JORP

PIPS-3.3.3.2-040

Demo

The IPS shall deliver to the SARR and SEM users the SARR 1b and SEM 1b data sets processed from the Metop global data. [Derived from existing requirement]

PIPS-3.3.3.2-050

RESERVED

### 3.3.3.3 Interface

PIPS-3.3.3.3-010

Demo

The IPS shall interface with the Darmstadt Interface, via the communication element, (and via the Communications Element and SOCC for GAC) for the following: [PGSL-3.2.2.3-020]:

- (a) Reception of NOAA satellites blind orbit global data from EPS
- (b) Metop satellite global data/information
- (c) Metop instrument Level 1 data sets
- (d) NOAA/EPS Cross-support data exchange

PIPS-3.3.3.3-020

Demo

The IPS shall have a GFT interface capability with the EPS ground segment for the following:

- (a) To deliver the data needed to preprocess NOAA satellite instrument data (e.g. satellite ephemeris or orbital state, on-board time correlation, instrument calibration parameters). [PGSL-3.2.2.3-021]

- (b) Receive the data needed to preprocess EPS satellite instrument data (e.g. satellite ephemeris, on-board time correlation and instrument calibration parameters). [PGSL-3.2.2.1-210]

#### **3.3.3.4 Performance**

PIPS-3.3.3.4-010

Demo

The IPS shall be capable of generating NOAA satellite blind orbit data Level 1 products in 3 minutes from the time of ingest. [NOAA req.]

PIPS-3.3.3.4-020

Demo

The IPS shall be capable of generating any selectable instrument (extracted from MHRPT) Level 1 data set in 30 minutes from the time of data ingest. [PGSL-3.2.2.4-110]

PIPS-3.3.3.4-030

Demo

The IPS shall be capable of generating Metop common instruments Level 1 products in 3 minutes from ingest at the IPS. [NOAA product requirement]

PIPS-3.3.3.4-040

Demo

The IPS shall store (on-line) the NOAA satellite Level 1 products for a period of TBD. [NOAA req.]

PIPS-3.3.3.4-050

Demo

The IPS shall store (on-line) the Metop satellite Level 1 products for a period of TBD. [NOAA req.]

#### **3.3.4 Product Generation & Distribution System (PGD) Element Requirements**

As previously stated, requirements applicable to the areas of Quality Control Standards, Maintainability, Training and Logistics are not specifically mentioned in this document based on the understanding that each element of the POES System is an operational entity and hence shall adopt their existing practice in these areas.

##### **3.3.4.1 Functional**

PPGD-3.3.4.1-010

Demo

The PGD shall be capable of receiving from the IPS element all preprocessed Level 1 data sets of common instruments (in full and reduced resolutions), in pipeline mode and granule format. [PGSL-3.2.2.1-010, PGSL-3.2.2.1-040, PGSL-3.2.2.1-230, PGSL-3.2.2.1-235]

PPGD-3.3.4.1-020

Demo

The PGD shall be capable of receiving the real time selectable instrument Level 1 data set extracted from MHRPT, processed by the IPS element, in pipeline mode and granule format. [PGSL-3.2.2.1-245, PGSL-3.2.2.4-110]

PPGD-3.3.4.1-030

Demo

The PGD shall be capable of receiving the Metop instruments Level 1 products ingested by the IPS element in pipeline mode and granule format. [PGSL-3.2.2.1-260]

PPGD-3.3.4.1-040

Demo

RESERVED

PPGD-3.3.4.1-050

Demo

The PGD shall be capable of receiving from IPS element all ancillary data required for the generation of Level 2 products from Level 1 data sets. [PGSL-3.2.2.1-230, PGSL-3.2.2.1-245]

PPGD-3.3.4.1-060

Demo

The PGD shall incorporate upgraded science algorithms and product generation systems for all required Level 2 products from the common instruments Level 1 data sets. [PGSL-3.2.2.1-230]

PPGD-3.3.4.1-070

Demo

The PGD shall develop new science algorithms and product generation systems for all required Level 2 products, for the Metop instruments Level 1 data sets. [PGSL-3.2.2.1-260]

PPGD-3.3.4.1-080

Demo

The PGD shall generate Level 2 and Level 3 products from the common instruments Level 1 data sets, to meet user requirements. [PGSL-3.2.2.1-230, PGSL-3.2.2.1-235]

PPGD-3.3.4.1-090

Demo

The PGD shall generate Level 2 and Level 3 products from the Metop instruments Level 1 data sets to meet user requirement. [PGSL-3.2.2.1-260]

PPGD-3.3.4.1-100

Demo

The PGD shall distribute all products generated by the PGD element to the archive facilities and NOAA user community, in near real time, via the Communication element. [PGSL-3.2.2.1-290]

### **3.3.4.2 Operational**

PPGD-3.3.4.2-010

Demo

The PGD shall be ready to support IJPS operations upon the successful completion of the System Commissioning Review (SCR) for Metop satellites and On-orbit Verification Review for NOAA satellites. [PGSL-3.2.2.2-010]

PPGD-3.3.4.2-020

Demo

The PGD shall perform the quality control of all products produced by the PGD for IJPS. [OSDPD standards]

PPGD-3.3.4.2-030

Demo

The PGD shall coordinate with IPS and communication elements for all data/information exchanges, cross-support activities and contingency operations, related to NOAA/IJPS/EPS ground segments. [PGSL-3.2.2.2-030]

PPGD-3.3.4.2-040

Demo

The PGD shall distribute all products generated by the PGD element as per predetermined schedule between PGD and the NOAA users. [PGSL-3.2.2.1-290]

### **3.3.4.3 Interface**

PPGD-3.3.4.3-010

Demo

The PGD shall interface with the IPS, via Communications element, for all data input needs, from both NOAA and Metop satellites. [PGSL-3.2.2.1-360]

PPGD-3.3.4.3-020

Demo

The PGD shall interface with the Communication element for all ancillary data input needs from other elements. [PGSL-3.2.2.1-360]

PPGD-3.3.4.3-030

Demo

The PGD shall interface with the Communication element for the distribution of all products produced by the PGD element. [PGSL-3.2.2.1-360]

### **3.3.4.4 Performance**

PPGD-3.3.4.4-010

Analysis

The PGD shall apply all currently existing product processing performance standards to all new product generation systems being developed in support of IJPS.

## **3.3.5 Data Archive & Access System (AAS) Requirements**

As previously stated, requirements applicable to the areas of Quality Control Standards, Maintainability, Training and Logistics are not specifically mentioned in this document based on the understanding that each element of the POES System is an operational entity and hence shall adopt their existing practice in these areas.

### **3.3.5.1 Functional**

PDAA-3.3.5.1-010

Inspection

The AAS shall include at least one Archive, Access and Distribution Facility (retrospective products) for the IJPS period. [PGSL-3.2.2.1-10, PGSL-3.2.2.1-40]

PDAA-3.3.5.1-020

Demo

The AAS shall be capable of archiving selected global/Level 1 data from Metop satellites in the IJPS period. [PGSL-3.2.2.1-300]

PDAA-3.3.5.1-030

Demo

The AAS shall archive the Level 1 data sets of the following Metop instruments received from the EPS, in the IJPS period. [PGSL-3.2.2.1-300]

(a) IASI 1c

- (b) ASCAT 1b
- (c) GOME 1b
- (d) GRAS 1b

PDAA-3.3.5.1-035

Demo

The AAS shall be capable of archiving the Level 1 data sets of the common instruments extracted from Metop global data, received from EPS, in the IJPS period. [PGSL-3.2.2.1-305]

PDAA-3.3.5.1-040

Demo

The AAS shall archive all supporting databases (ancillary, auxiliary, metadata, etc.) associated with the common instrument data extracted from Metop global data. [PGSL-3.2.2.1-305]

PDAA-3.3.5.1-050

Demo

The AAS shall archive all supporting databases (ancillary, auxiliary, metadata, etc.) associated with Metop satellite Level 1 data sets, received from EPS, in the IJPS period. [PGSL-3.2.2.1-310]

PDAA-3.3.5.1-060

Demo

The AAS shall be capable of archiving all Level 2 and Level 3 products generated by the PGS from both NOAA and Metop satellites data in the IJPS period. [PGSL-3.2.2.1-320]

PDAA-3.3.5.1-070

Demo

The AAS shall be capable of distributing (retrospective) Level 1 product produced from Metop satellite global/Level 1 data in the IJPS period to users. [PGSL-3.2.2.1-280]

PDAA-3.3.5.1-075

Demo

The AAS shall be capable of distributing Level 1 products produced from the common instruments data extracted from Metop global data, in the IJPS period to users. [PGSL-3.2.2.1-270]

PDAA-3.3.5.1-080

Demo

The AAS shall be capable of distributing (retrospective) NOAA Level 2 and 3 products from the Metop satellite data in the IJPS period to users. [PGSL-3.2.2.1-290]

PDAA-3.3.5.1-085

Demo

The AAS shall be capable of distributing NOAA Level 2 and 3 products produced from the common instruments data extracted from Metop global data, in the IJPS period. [PGSL-3.2.2.1-295]

PDAA-3.3.5.1-090

Demo

The AAS shall be capable of distributing (retrospective) all archived ancillary, metadata, and supporting databases for both NOAA and Metop satellite to users in the IJPS period. [PGSL-3.2.2.1-290]



### 3.3.5.2 Operational

PDAA-3.3.5.2-010

Demo

The AAS shall be accessible for retrieval/distribution of all archived data and products by the NOAA user community. [PGSL-3.2.2.1-280, PGSL-3.2.2.1-285, PGSL-3.2.2.1-290, PGSL-3.2.2.1-295]

### 3.3.5.3 Interface

PDAA-3.3.5.3-010

Demo

The AAS shall interface with the IPS element, via communication element, for receiving Level 1 data and associated databases for archiving in the IJPS period. [PGSL-3.2.2.1-360, PGSL-3.2.2.3-090]

PDAA-3.3.5.3-020

Demo

The AAS shall interface with the PGD element, via communication element, for receiving Level 2 and higher products and associated databases for archiving in the IJPS period. [PGSL-3.2.2.1-360, PGSL-3.2.2.3-090]

PDAA-3.3.5.3-030

Demo

The AAS shall provide an interface to locate and retrieve the archived data and information for the NOAA user community. [PGSL-3.2.2.3-090]

### 3.3.5.4 Performance

PDAA-3.3.5.4-010

Analysis

The AAS shall be sized for archiving all designated data/information in support of the IJPS mission. [PGSL-3.2.2.1-300, PGSL-3.2.2.1-310, PGSL-3.2.2.1-320]

## 3.3.6 Communications Element Requirements

As previously stated, requirements applicable to the areas of Quality Control Standards, Maintainability, Training and Logistics are not specifically mentioned in this document based on the understanding that each element of the POES System is an operational entity and hence shall adopt their existing practice in these areas.

### 3.3.6.1 Functional

PCOM-3.3.6.1-010

Demo

The Communications Element shall provide for telecommunications capabilities among the PGS elements and Users to ensure the following: [PGSL-3.2.2.1-010, PGSL-3.2.2.1-330]

- (a) Data and information exchange
- (b) Timeliness requirement as defined by each element
- (c) Meet data transfer reliability as defined by each element

PCOM-3.3.6.1-020

Demo

The Communications Element network shall be sized based on the individual element bandwidth needs for the data types, information and timeliness requirements. [PGSL-3.2.2.1-330]

PCOM-3.3.6.1-030

Demo

RESERVED

PCOM-3.3.6.1-040

Demo

The Communications Element shall ensure data interchange and interface compatibility among the PGS elements for data rates, data types, data quantity and modes of operation. [PGSL-3.2.2.1-330]

PCOM-3.3.6.1-050

Demo

The Communications Element shall provide telecommunications capabilities between the PGS and the Darmstadt/single point Interface for acquiring from Darmstadt the following data types. [PGSL-3.2.2.1-10, PGSL-3.2.2.1-340, PGSL-3.2.2.3-050]

- (a) NOAA GAC/SAIP/STIP in pipeline mode
- (b) Metop global data in pipeline mode
- (c) NOAA TIP/AIP/HRPT in throughput mode
- (d) NOAA TC Echo in throughput mode
- (e) Metop instrument Level 1 data sets
- (f) Cross-support and operations planning data

PCOM-3.3.6.1-060

Demo

The Communications Element shall provide telecommunications capabilities between the PGS and the Darmstadt/single point Interface for transferring to Darmstadt the NOAA satellite telecommands for NOAA blind orbits in throughput mode. [PGSL-3.2.2.1-350]

PCOM-3.3.6.1-070

Demo

The Communications Element shall maintain all existing telecommunications capabilities between NESDIS and external interfaces during the IJPS period. [PGSL-3.2.2.1-360]

### 3.3.6.2 Operational

PCOM-3.3.6.2-010

Demo

The Communications Element shall not disrupt existing data/information links between the PGS and external agencies/entities, including NWS and DOD, in the IJPS period. [PGSL-3.2.2.1-360, PGSL-3.2.2.3-100, PGSL-3.2.2.3-110]

### 3.3.6.3 Interface

PCOM-3.3.6.3-010

Demo

The Communications Element shall network and ensure interface compatibility between all the PGS element interfaces as required by each element. [PGSL-3.2.2.1-330]

PCOM-3.3.6.3-020

Demo

The Communications Element shall ensure complete interface compatibility between the PGS and Darmstadt Interface points for all types of data reception and transmission. [PGSL-3.2.2.3-050]

PCOM-3.3.6.3-030

RESERVED

PCOM-3.3.6.3-040

Demo

The Communications Element shall provide a data buffering capacity, for data acquired from Darmstadt Interface, to contain a minimum of one complete download of NOAA GAC or SAIP or STIP data and one complete download of GDS data, at all times. [PGSL-3.2.2.3-065]

### 3.3.6.4 Performance

PCOM-3.3.6.4-010

Demo

The Communications Element shall size the Communications network between the Fairbanks CDA station and the Suitland Interface to comply with the following data transport criteria. [PGSL-3.2.2.4-020, PGSL-3.2.2.4-050, PGSL-3.2.2.4-060, PGSL-3.2.2.4-080]

- (a) Always ensure that 98.8% of any data type is successfully transferred between the Fairbanks CDA station and the Suitland interface over any 30-day period
- (b) First global data no later than 2 minutes after loss of signal
- (c) Last data no later than 100 minutes after download completion
- (d) The delay, between the TM Frame complete acquisition at the CDA station and its availability at the interface, shall be less than 1 second
- (e) Maximum downtime of the TM/TC transport chain between the CDA station and the interface shall not exceed 100 minutes

PCOM-3.3.6.4-020

Demo

The Communications Element shall size the Communications network between the NOAA CDA station and the Suitland Interface to comply with the following Metop satellite data transport criteria. [PGSL-3.2.2.4-030]

- (a) UTC time stamp appended
- (b) First data no later than 2 minutes after download completion
- (c) Last data no later than 100 minutes after download completion
- (d) Data available in a pipeline mode

PCOM-3.3.6.4-030

Analysis

The Communications Element shall not exceed a 360 minutes maximum downtime limit for the NOAA CDA station to the Suitland Interface data delivery chain in a 30-day period. [PGSL-3.2.2.4-080]

PCOM-3.3.6.4-040

Demo

The Communications Element shall size the link(s) between the PGS and Darmstadt interfaces to accommodate the following: [PGSL-3.2.2.1-340, PGSL-3.2.2.1-350]

- (a) Data quantity
- (b) Data rate
- (c) Bit error rate



## **4.0 Verification and Validation (V&V) Requirements**

This section presents the overall Verification and Validation (V&V) program requirements for the NOAA POES System for its support of the IJPS system.

### **4.1 Scope**

The scope of the POES system V&V activities to support the IJPS system shall provide the basis for verifying and validating all the requirements stated in Section 3 of this document. Methods used in V&V activities for the POES system changes/modifications include analysis, demonstration, inspection, and test.

The overall V&V activities are performed in discrete phases that include the Procurement/Contract, POES Launch Readiness, and POES and EPS Joint Systems test phases as described herein. During the Procurement/Contract phase, V & V activities shall be required under all procurement/contract actions to update the POES system to support the IJPS system. Verification activities may include reviewing analyses resulting from design and development activities and witnessing testing required by the contract. Inspections and demonstrations may also be performed, as appropriate and included in the contractor's approved plans.

NOAA performs POES Launch Readiness V&V activities on a continuing basis to prepare for future POES missions. This phase includes the V & V of system upgrades, flight-to-flight changes, and major changes/modifications to enhance the POES System. The changes/modifications to the POES system to support the IJPS system shall be tested during Launch Readiness activities to assess their compliance with POES requirements. Launch Readiness V & V activities are progressive and includes element, segment, and system level tests. Completion of the Launch Readiness V&V phase will represent the milestone that the POES System is ready to support POES and EPS Joint Systems phase of testing.

POES and EPS Joint Systems V & V shall be conducted to validate interface and compatibility requirements between the two systems. This phase of joint V&V activities requires the resources of both the POES and EPS systems performing in proper synchronization. In the IJPS time period, NOAA and EUMETSAT are responsible for operating the POES and EPS systems respectively in support of the IJPS mission. Joint tests will validate that the POES and EPS systems are operationally compatible in sending commands to their respective satellite, and in receiving satellite environmental and telemetry data. Joint testing will validate that satellite data can be shared between systems while satisfying product processing timeliness requirements. Testing will also verify that planned joint contingency operations can be supported. With the completion of the POES and EPS Joint Systems V & V activity phase, all requirements on the POES system for its support to the IJPS system will be verified and validated.

## 4.2 General Requirements

The following general requirements shall be common to all phases of the NOAA POES V&V activities. These requirements will be reflected in the preparation of detailed documents as defined herein and in the conduct of the required activities, as appropriate.

1. V & V documentation shall be provided by the NESDIS organizational element with assigned responsibilities for each system element. The NESDIS Office of Systems Development (OSD) shall be responsible for providing guidance to NESDIS organizational elements through the NOAA POES System Master Verification and Validation Plan for IJPS.
2. V & V documentation will be updated to reflect the latest changes in requirements that result from changes to the baseline requirements.
3. Successful completion of V&V activities for each level of POES Launch Readiness testing and for each phase of NOAA IJPS Joint System testing will be used to mark milestones to measure progress.
4. Inspections shall be performed prior to each test. Individual test inspections will ensure that the test configuration is in accordance with approved test procedures, equipment and software under test are at the correct revision level, and that prior deficiencies or discrepancies have been corrected.
5. V&V activity shall be conducted in the actual operational environment. If it is not possible due to complexity, cost, etc, the environment will be a very close simulation of the actual operational environment.
6. Actual data from operational satellites shall be used to support planned verification and validation testing. If such data is not available, very close simulated data may be used.
7. The test data types, formats, rates and quantities shall simulate actual operational conditions.
8. End-to-end test scenarios shall be part of V & V testing activities to verify system interfaces and overall system performance of the integrated POES system.

### **4.3 Documentation Requirements**

The following common documents shall be used for all phases of POES system V & V as appropriate.

#### **4.3.1 Verification and Validation Plans**

NESDIS/OSD will prepare the NOAA POES System Master Verification and Validation Plan to provide NOAA/IJPS with a concise document containing information to plan, coordinate, conduct, report and track NOAA's IJPS system V & V activities. V & V plans will also be prepared for each level and phase of POES testing as required to implement V & V activities. Plans will describe in specific terms how the requirements on the POES system will be satisfied. V & V plans will serve as the basis for preparation of V & V procedures. Contractor prepared plans will follow the general requirements contained in Section 4.2. The assigned NESDIS organization for each POES system element will prepare a V & V plan to coordinate required resources and requirements to be satisfied. OSD will prepare a POES System Verification and Validation Plan to verify the NOAA/IJPS requirements that address the POES Segment integration and System level verifications, based on the successful verification of all element level requirements prior to starting these tests. Coordination of the overall planning effort is the responsibility of OSD.

OSD will be the focal point for establishing and coordinating the NOAA V&V activities with EUMETSAT. The requirements will be documented in a jointly developed plan.

#### **4.3.2 Verification and Validation Procedures**

V & V procedures shall be prepared for each approved V & V plan. Separate procedures will be prepared for each test to be performed in the approved plans. Contractor procedures to verify Section 3 requirements will be prepared for Government approval. The assigned NESDIS organization for each POES system element will prepare procedures to verify each change/modification to POES system elements. OSO, OSDPD, and NCDC will prepare new and updated procedures for conducting tests for the integration of POES Ground Segment elements and the POES System to validate that the POES system is ready for joint testing with the EPS system. OSO will also be responsible for preparing and coordinating POES test procedures for conducting joint testing activities with the EPS to validate IJPS requirements. OSDPD and NCDC will provide inputs to joint test procedures requiring the support of POES system elements under their control.

#### **4.3.3 Event Logs**

Event logs shall be used to maintain a record during the conduct of all POES testing. Event logs shall contain, but not be limited to, the following information:

1. Results of pretest inspections,
2. Exceptions to approved test procedures and test configurations,
3. Start and completion times of tests,
4. Test anomalies, including unexpected test results or equipment failures,



5. Corrections taken to fix test anomalies,
6. Results of retesting performed to verify corrective actions, and
7. Test procedure paragraph references and the date and time of entry.

#### **4.3.4 Reports**

Reports will be prepared for all levels and phases of the V & V activities as identified in the NOAA IJPS System Master Verification and Validation Plan for IJPS.

#### **4.4 Requirements Allocation and Traceability**

Included in Attachment A-1 is the POES System Requirements Traceability and Verification Matrix. This table lists the system level requirements identified in Section 3 and associates them with the allocated requirements at the segment level that comprise the requirement. The level at which verification will be performed and the verification method to be used are also identified.

Included in Attachment A-2 is the POES Segment Requirements Traceability and Verification Matrix. This table lists the requirements identified in Section 3 that have been allocated to the POES segments and associates them with the allocated requirements at the element level that comprise the requirement. The level at which verification will be performed and the verification method to be used are also identified.

## Attachment A-1

### System Requirements Traceability and Verification Matrix

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
	<b>3.1 System Requirements</b> <b>3.1.1 Functional</b>						
PSYS-3.1.1-010	The POES system shall collect, exchange, store and disseminate global environmental data to users for determining the state of the Earth's environment for application to operational meteorological and environmental forecasting and global climate monitoring in support of the IJPS mission	PIP, 2.4.1	PSAT-3.2.1.1.1-010, PGSL-3.2.2.1-010			JD	
PSYS-3.1.1-015	The POES system shall collect, exchange and disseminate local data in real time to users for operational meteorological and environmental forecasting in support of the IJPS mission.	PIP, 3.1	PSAT-3.2.1.1.1-050 PGSL-3.2.2.1-115			JD	
PSYS-3.1.1-020 (a)	The POES system shall be comprised of the following: -a series of two operational satellites (NOAA-N and -N') flown consecutively in an orbit with an "afternoon" equatorial crossing time (ascending node).	PIP, 3.1	PSAT-3.2.1.1.1-020 PSAT-3.2.1.1.2-010 PSAT-3.2.1.1.3-010 PSAT-3.2.1.1.4-010 PSLV-3.2.1.2.1-010 PSLV-3.2.1.2.1-020 PSLV-3.2.1.2.2-010 PSLV-3.2.1.2.3-010 PSLV-3.2.1.2.4-010 PSLV-3.2.1.2.4-020		D, I		
PSYS-3.1.1-020 (b)	The POES system shall be comprised of the following: -a series of two spacecraft with a set of common (with Metop) instruments (AVHRR, HIRS, AMSU-A, MHS, SEM, SRSAT and A-DCS) and an additional instrument (SBUV) unique to the POES mission.	PIP, 2.5.1, 3.1, 3.2.1	PSAT-3.2.1.1.1-030		D, I		
PSYS-3.1.1-020 ©	The POES system shall be comprised of the following: -at least one Command and Data Acquisition (CDA) station and a geographically separate back-up.	PIP, 3.1.	PGSL-3.2.2.1-020		D, I		
PSYS-3.1.1-020 (d)	The POES system shall be comprised of the following: -at least one Satellite Operations Control Center and a geographically separate back up.	PIP, 3.1	PGSL-3.2.2.1-030		D, I		
PSYS-3.1.1-020 (e)	The POES system shall be comprised of the following: - at least one Data Processing, Distribution and Archive Facility.	PIP, 3.1	PGSL-3.2.2.1-040		D, I		

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/POES	IJPS	
PSYS-3.1.1-020 (f)	The POES system shall be comprised of the following: -telecommunications capabilities for command, telemetry and data exchange.	PIP, 3.1, 3.2.1, 3.2.3	PGSL-3.2.2.1-330 PGSL-3.2.2.1-340 PGSL-3.2.2.1-350 PGSL-3.2.2.1-360		D, I		
PSYS-3.1.1-030	The POES system global data shall include the NOAA satellite instrument set and spacecraft/instrument state of health.	PIP, 3.1	PSAT-3.2.1.1.1-040		D		
PSYS-3.1.1-040	The Metop global data (GDS) acquired by the POES system from the EPS ground segment shall include the common instrument set and the additional Metop instrument set (Infrared Atmospheric Sounding Interferometer (IASI), Advanced Scatterometer (ASCAT), Global Navigation Satellite System Receiver for Atmospheric Sounding (GRAS), and Global Ozone Monitoring Experiment (GOME-2)), spacecraft/instrument state of health and administrative messages.	PIP, 3.1	PGSL-3.2.2.1-050			JD	
PSYS-3.1.1-050	The POES system shall retrieve the Metop satellite global data from the EPS.	PIP, 3.6.3	PGSL-3.2.2.1-050			JD	
PSYS-3.1.1-060	The POES system shall provide a throughput mode commanding access and transmit capability to one Metop operational satellite at a time via a PGS CDA station, for cross-support operations	PIP, 3.6.1.2	PGSL-3.2.2.1-080			JD	
PSYS-3.1.1-070	The POES system shall receive housekeeping telemetry data from one Metop operational satellite at a time while over the PGS CDA station for cross-support operations and make it available to EPS, in a real time throughput mode.	PIP, 3.6.1.2	PGSL-3.2.2.1-090 PGSL-3.2.2.1-100 PGSL-3.2.2.1-110			JD	
PSYS-3.1.1-075	The POES system shall acquire real time MHRPT data from one Metop operational satellite at a time while over either PGS CDA stations and process/extract any selectable instrument and telemetry data, and transfer it to the NOAA IPS element.	NOAA	PGSL-3.2.2.1-115 PGSL-3.2.2.1-116			JT	
PSYS-3.1.1-080	The POES system shall be sized to provide blind orbit cross-support to one Metop operational satellite at a time, any additional requests to be accommodated within the sizing of the system	PIP, 3.6.1.2, 3.6.3	PGSL-3.2.2.1-120		A		

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PSYS-3.1.1-090	The POES system shall be capable of scheduling, generating and transferring satellite commands to the NOAA-N and then NOAA-N' satellites via the EPS ground segment, in real time, for NOAA blind orbit cross-support operations.	PIP, 3.6.1.2	PGSL-3.2.2.1-130			JD	
PSYS-3.1.1-100	The POES system shall acquire NOAA-N and NOAA-N' real time housekeeping telemetry data from the EPS ground segment for NOAA blind orbit and cross-support operations.	PIP, 3.6.1.2	PSAT-3.2.1.1.1-060 PGSL-3.2.2.1-141			JD	
PSYS-3.1.1-105	The POES system shall acquire the NOAA-N and -N' telecommand-echo made available by the EPS PCDA station in real time, for NOAA blind orbit and cross-support operations.	PIP, 3.6.1.2	PGSL-3.2.2.1-140			JD	
PSYS-3.1.1-110	The POES system shall make available to EPS the operational NOAA satellite global data received by the PGS CDA station.	PIP, 3.6.3	PGSL-3.2.2.1-150 PGSL-3.2.2.1-160 PGSL-3.2.2.1-390 PGSL-3.2.2.2-060				
PSYS-3.1.1-120	The POES system shall be capable of receiving global data from one Metop operational satellite at a time while over the PGS CDA station, for EPS blind orbits.	PIP, 3.6.3 EPS IRD, 4.2, Metop S-G IS,	PGSL-3.2.2.1-090			JD	
PSYS-3.1.1-130	The POES system shall make available to EPS the operational Metop satellite global data acquired by the PGS CDA station.	PIP, 3.6.3	PGSL-3.2.2.1-100 PGSL-3.2.2.1-400 PGSL-3.2.2.2-070			JD	
PSYS-3.1.1-140	The POES system shall retrieve from the EPS ground segment the global data of the operational NOAA-N and -N' satellite for NOAA blind orbits	PIP, 3.6.3	PSGL-3.2.2.1-060 PSGL-3.2.2.1-070 PGSL-3.2.2.1-115 PGSL-3.2.2.1-231			JD	
PSYS-3.1.1-150	The POES system shall complete the transfer of the Metop global data from orbit n, to the Suitland Interface for EPS to retrieve, before the scheduled acquisition from n+1.	PIP, 3.6.3	PGSL-3.2.2.1-221			JD	
PSYS-3.1.1-160	The POES system shall make available to EPS the MHS housekeeping data received from the NOAA satellites.	PIP, 3.6.1.3	PGSL-3.2.2.1-170			JD	
PSYS-3.1.1-170	The POES system shall acquire the housekeeping data, for the NOAA provided instruments, from the EPS ground segment, received from the EPS Metop satellites.	PIP, 3.6.1.3	PGSL-3.2.2.1-180			JD	

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/POES	IJPS	
PSYS-3.1.1-180	The POES system shall make available to the EPS all the data necessary to preprocess NOAA satellite instrument data (e.g. satellite ephemeris or orbital-state, on-board time correlation, instrument calibration parameters and updates).	PIP, 3.6.3, 3.1,	PGSL-3.2.2.1-200 PGSL-3.2.2.3-021			JD	
PSYS-3.1.1-190	The POES system shall acquire from EPS all the data necessary to preprocess Metop satellite instrument data (e.g. satellite ephemeris or orbital state, on-board time correlation, instrument calibration parameters and updates).	PIP, 3.1, 3.6.3	PGSL-3.2.2.1-210			JD	
PSYS-3.1.1-200	The POES system shall be capable of ingesting and preprocessing the Level 0 common instruments data extracted from the Metop global data, to NOAA Level 1 (i.e. sorting of the data, earth location and appending or application of the calibration coefficients, and performance of the associated quality control).	PIP, 3.6.4	PGSL-3.2.2.1-220			JD	
PSYS-3.1.1-210	The POES system shall be capable of ingesting and preprocessing any selectable instrument and telemetry data extracted from Metop HRPT received at PGS CDA station, for NOAA users.	NOAA	PGSL-3.2.2.1-240 PGSL-3.2.2.1-245		T		
PSYS-3.1.1-215	The POES system shall be capable of producing products from the common instruments data extracted from the Metop global data	AD-2, 3.6.4	PGSL-3.2.2.1-230				
PSYS-3.1.1-220	The POES system shall receive and process the Metop instrument Level 1 data from the EPS to meet NOAA user requirements.	PIP, 3.6.4	PGSL-3.2.2.1-220 PGSL-3.2.2.1-222 PGSL-3.2.2.1-230 PGSL-3.2.2.1-235 PGSL-3.2.2.1-260			D, JT	
PSYS-3.1.1-230	The POES system shall distribute all preprocessed global data and products produced by NOAA to the user community.	PIP, 3.6.4	PGSL-3.2.2.1-280 PGSL-3.2.2.1-290		D		
PSYS-3.1.1-240	The POES system shall archive global data and associated databases received from the EPS.	PIP, 3.6.4	PGSL-3.2.2.1-300 PGSL-3.2.2.1-310		D		
PSYS-3.1.1-250	The POES system shall archive all products generated by the PGS.	PIP, 3.6.4	PGSL-3.2.2.1-320 PGSL-3.2.2.1-320		D		

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/POES	IJPS	
PSYS-3.1.1-260	The POES system shall provide for telecommunications capabilities among the PGS elements and existing external interfaces, to ensure timely and reliable exchange of command, telemetry/housekeeping and global data, and systems information in support of IJPS operations	MOA, 3.3.4 PIP, 3.6.1.2, 3.6.1.3, 3.6.3	PGSL-3.2.2.1-330 PGSL-3.2.2.1-360 PGSL-3.2.2.2-050 PGSL-3.2.2.2-060 PGSL-3.2.2.3-021		D		
PSYS-3.1.1-270	The POES system shall provide for telecommunications capabilities between the Suitland Interface and the Darmstadt Interface, to ensure timely and reliable exchange of command, telemetry/housekeeping and global data, and system information in support of IJPS operations.	MOA, 3.3.4 PIP, 3.6.1.2, 3.6.1.3, 3.6.3	PGSL-3.2.2.1-340 PGSL-3.2.2.1-350 PGSL-3.2.2.2-040			JD	
PSYS-3.1.1-280	The POES system shall maintain instrument calibration databases for the Metop satellite instruments, to support product generation needs in the IJPS period.	PIP, 3.6.4	PGSL-3.2.2.1-370		D		
	<b><u>3.1.2 Operational</u></b>						
PSYS-3.1.2-010	The POES system operational phase for an IJPS satellite shall start upon the successful completion of the System Commissioning Review (SCR) for Metop satellites and On-orbit Verification Review for NOAA satellites.	PIP, 3.6.1.1	PGSL-3.2.2.2-010		A		
PSYS-3.1.2-020	The POES system shall control the day-to-day operations, in coordination with the EPS ground segment, anomaly resolution and health/safety of NOAA satellites including all instruments (regardless of the origin) in the IJPS period.	PIP, 3.6.1.1, 3.6.4	PGSL-3.2.2.2-030		D		
PSYS-3.1.2-030	The POES system shall provide for a rolling archive of 7 days of the NOAA-N and N' and Metop global data acquired at the CDA stations.	PIP, 3.6.3	PGSL-3.2.2.2-020		D		
PSYS-3.1.2-040	The POES system shall develop detailed joint plans and procedures with EPS for supporting nominal, contingency and split-mission scenario operations.	PIP, 3.6.2	PGSL-3.2.2.2-060 PGSL-3.2.2.2-070 PGSL-3.2.2.2-080			JA	
	<b><u>3.1.3 Interface</u></b>						
PSYS-3.1.3-010	The POES system shall be capable of interfacing with the EPS space segment as defined in AD-5 (L, S, and X bands).	PIP, 3.6.1.2, 3.6.3	PGSL-3.2.2.1-380 PGSL-3.2.2.3-010 PGSL-3.2.2.3-120			JD	

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PSYS-3.1.3-020	The POES system shall be capable of exchanging data with EPS as established in Article 8 of the IJPS Agreement and as applicable to NOAA.	PIP, 3.6.3	PGSL-3.2.2.2-080 PGSL-3.2.2.3-021 PGSL-3.2.2.3-025			JD	
PSYS-3.1.3-030	The POES system shall provide for a NOAA Suitland Interface for data exchange, cross-support operational activities, day-to-day joint tasks coordination, and blind orbit support with the EPS.	PIP, 3.6.1.2, 3.6.2	PGSL-3.2.2.3-020 PGSL-3.2.2.3-030 PGSL-3.2.2.3-035 PGSL-3.2.2.3-040			JD	
PSYS-3.1.3-035	The POES system shall provide for a voice loop exchange for operational coordination with the EPS.	PIP, 3.6.2	PGSL-3.2.2.3-025			JD	
PSYS-3.1.3-040	The POES system shall be capable of interfacing with the EPS for NOAA to retrieve/exchange information in support of IJPS operations	PIP, 3.6.3	PGSL-3.2.2.3-050 PGSL-3.2.2.3-060 PGSL-3.2.2.3-070 PGSL-3.2.2.3-080		D		
PSYS-3.1.3-050	The POES system shall provide an interface for the distribution of the NOAA global data, to users and the Department of Defense in the IJPS period.	Shared Processing	PGSL-3.2.2.3-090 PGSL-3.2.2.3-100		D		
PSYS-3.1.3-060	The POES system shall provide an interface for the distribution of the common instrument data extracted from Metop global data, to users and the Department of Defense in the IJPS period.	Shared Processing	PGSL-3.2.2.3-110		D		
	<b>3.1.4 Performance</b>						
PSYS-3.1.4-010	The POES system shall be capable of supporting the launch of a new NOAA satellite within 120 days of notification.	MOA, 4.1.3	PGSL-3.2.2.4-010		A		
PSYS-3.1.4-020	The POES system shall make available to the EPS ground segment the data on a mutually agreed basis and meet the processing timeliness, as defined at the Segment and Element levels.	PIP, 3.6.3	PGSL-3.2.2.4-020 PGSL-3.2.2.4-030 PGSL-3.2.2.4-040 PGSL-3.2.2.4-050 PGSL-3.2.2.4-060 PGSL-3.2.2.4-070 PGSL-3.2.2.4-080 PGSL-3.2.2.4-090 PGSL-3.2.2.4-100			JT	
PSYS-3.1.4-030	The POES system shall complete product processing of any selectable instrument and telemetry data, extracted from MHRPT received at a PGS CDA station and deliver product to users in less than 30 minutes from observation.	Data Services Oversight Panel	PGSL-3.2.2.4-110		T		

## Attachment A-2

### Segment Requirements Traceability and Verification Matrix

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
	<b><u>3.2 Segment Requirements</u></b>						
	<b><u>3.2.1 Space Segment Requirements</u></b>		Allocated to NASA				
	<b><u>3.2 Polar Ground Segment Requirements</u></b> <b><u>3.2.2.1 Functional</u></b>						
PGSL-3.2.2.1-010	The PGS shall collect, exchange, store and disseminate global environmental data to users for application to operational meteorological and environmental forecasting and global climate monitoring in support of the IJPS mission.	PSYS-3.1.1-010	PCDAS-3.3.1.1-020 PSOC-3.3.2.1-010 PIPS-3.3.3.1-010 PPGD-3.3.4.1-010 PDAA-3.3.5.1-010 PCOM3.3.6.1-010/050		D		
PGSL-3.2.2.1-020	The PGS shall include at least one primary (Fairbanks) and a backup CDA station.	PSYS-3.1.1-020	PDCA-3.3.1.1-010		I		
PGSL-3.2.2.1-030	The PGS shall include at least one primary and a backup SOCC.	PSYS-3.1.1-020	PSOC-3.3.2.1-025		I		
PGSL-3.2.2.1-040	The PGS shall include at least one data processing, distribution and archive facility.	PSYS-3.1.1-020	PIPS-3.3.3.1-010 PPGD-3.3.4.1-010 PDAA-3.3.5.1-010		I		
PGSL-3.2.2.1-050	The PGS shall be capable of acquiring from the Darmstadt Interface, the operational Metop satellite global data, made available by EPS.	PSYS-3.1.1-040, PSYS-3.1.1-050	PSOC-3.3.2.1-030		D		
PGSL-3.2.2.1-060	The PGS shall be capable of acquiring from the Darmstadt Interface, the NOAA satellite blind orbit global data, made available by EPS.	PSYS-3.1.1-140	PSOC-3.3.2.1-040 PCOM-3.3.6.1-010/050		D		
PGSL-3.2.2.1-070	In the event the global data from NOAA-N or N' satellites is unavailable, the PGS shall be capable of acquiring the Stored AIP (SAIP) or Stored TIP (STIP) data from the Darmstadt Interface.	PSYS-3.1.1-140	PSOC-3.3.2.1-040 PCOM-3.3.6.1-010/050		D		



Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PGSL-3.2.2.1-080	The PGS shall be capable of receiving, transporting (in throughput mode) and uplink telecommand to the Metop satellites through the Fairbanks CDA station, for Metop blind orbits, in compliance with performance requirements in Sec. 3.2.2.4.	PSYS-3.1.1-060	PCDAS-3.3.1.1-040/050 PCDAS-3.3.1.4-100 PSOC-3.3.2.1-020/050/060 PSOC-3.3.2.4-070		D		
PGSL-3.2.2.1-090	The PGS shall be capable of receiving the global and housekeeping telemetry data from one Metop operational satellite at a time, at the Fairbanks CDA station, for EPS cross-support operations.	PSYS-3.1.1-070/120/130	PCDAS-3.3.1.1-020 PSOC-3.3.2.1-050/070/080 PCOM-3.3.6.1-010/050		D		
PGSL-3.2.2.1-100	The PGS shall be capable of delivering to the Suitland Interface the global data acquired from the Metop satellite, by the Fairbanks CDA station, in compliance with performance requirements stated in Section 3.2.2.4	PSYS-3.1.1-070/130	PCDAS-3.3.1.1-060/070 PCDAS-3.3.1.4-080 PSOC-3.3.2.1-010/090		D		
PGSL-3.2.2.1-110	The PGS shall be capable of delivering to the Suitland Interface the operational Metop housekeeping telemetry data in throughput mode, for cross support and in compliance with performance requirements.	PSYS-3.1.1-070	PCDAS-3.3.1.1-020 PCDAS-3.3.1.4-080		D		
PGSL-3.2.2.1-115	The PGS shall receive the MHRPT data in real time at the PGS CDA stations, as defined in AD-5.	PSYS-3.1.1-015/075	PCDAS-3.3.1.1-020/025 PSOC-3.3.2.1-010/100/110		D		
PGSL-3.2.2.1-116	The PGS shall be capable of extracting and preprocessing any selectable instrument and telemetry data, from the MHRPT data for NOAA users.	PSYS-3.1.1-075	PCDAS-3.3.1.1-030 PSOC-3.3.2.1-010		D		
PGSL-3.2.2.1-120	The PGS shall be sized to provide blind orbit cross-support to one operational EPS satellite with any additional requests to be accommodated within the sizing of the system.	PSYS-3.1.1-080	PCDAS-3.3.1.1-080 PSOC-3.3.2.1-120		D		
PGSL-3.2.2.1-130	The PGS shall be capable of scheduling, generating and delivering telecommand to the Darmstadt Interface, for transfer in real time to NOAA satellites by EPS ground segment, for NOAA blind orbit cross-support operations.	PSYS-3.1.1-090	PSOC-3.3.2.1-020/130		D		
PGSL-3.2.2.1-140	The PGS shall be capable of acquiring NOAA satellite telecommand-echo, from the Darmstadt Interface, for NOAA blind orbits.	PSYS-3.1.1-105	PSOC-3.3.2.1-140		D		
PGSL-3.2.2.1-141	The PGS shall be capable of acquiring NOAA satellite housekeeping telemetry in real time, from the Darmstadt Interface, for NOAA blind orbits.	PSYS-3.1.1-100	PSOC-3.3.2.1-150		D		

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PGSL-3.2.2.1-145	The PGS shall be capable of acquiring and transferring to the Suitland Interface, the Metop telecommand-echo, in a throughput mode, for cross-support operations.	PSYS-3.1.1-060	PCDAS-3.3.1.1-090 PSOC-3.3.2.1-020		D		
PGSL-3.2.2.1-150	The PGS shall be capable of delivering to the Suitland Interface the NOAA-N and then -N' global data at the raw data level, acquired by the PGS CDA stations, in compliance with performance requirements in Section 3.2.2.4.	PSYS-3.1.1-110	PCDAS-3.3.1.1-100 PSOC-3.3.2.1-160		D		
PGSL-3.2.2.1-160	The PGS shall be capable of delivering to the Suitland Interface the NOAA-N and then -N' split-mission global or SAIP or STIP data received at the PGS CDA stations per any of the combinations below. (a) 2 orbits of GAC (b) 1 orbit GAC and 1 orbit of SAIP (c) 1 orbit GAC and 1 orbit of STIP (d) 2 orbits SAIP (e) 1 orbit SAIP and 1 orbit of STIP (f) 2 orbits STIP	PSYS-3.1.1-110	PCDAS-3.3.1.1-110 PSOC-3.3.2.1-170/180/190		A		
PGSL-3.2.2.1-170	The PGS shall be capable of delivering to the Darmstadt Interface, the MHS telemetry data extracted from NOAA satellites global data, via the Communication element, in compliance with performance requirements in Section 3.2.2.4	PSYS-3.1.1-160	PCDAS-3.3.1.1-020 PSOC-3.3.2.1-010		D		
PGSL-3.2.2.1-180	The PGS shall be capable of acquiring, processing, analyzing and displaying the NOAA instrument telemetry/housekeeping data from the Darmstadt Interface, received from Metop satellites.	PSYS-3.1.1-170	PSOC-3.3.2.1-040/200		D		
PGSL-3.2.2.1-190	The PGS shall complete the delivery of the Metop global data to the Suitland Interface from orbit n before the scheduled acquisition from orbit n+1, in compliance with performance requirements.	PSYS-3.1.1-150	PCDAS-3.3.1.1-120 PSOC-3.3.2.1-210		D		
PGSL-3.2.2.1-200	The PGS shall be capable of delivering to the Darmstadt Interface via a GFT interface the data needed to preprocess NOAA satellite instrument data (e.g. satellite ephemeris or orbital-state, on-board time correlation, instrument calibration parameters).	PSYS-3.1.1-180	PIPS-3.3.3.2-050		D		

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PGSL-3.2.2.1-210	The PGS shall be capable of acquiring from the EPS, via a GFT interface, the data necessary to preprocess Metop satellite instrument data (e.g. satellite ephemeris or orbital state, on-board time correlation, instrument calibration parameters).	PSYS-3.1.1-190	PIPS-3.3.3.3-020		D		
PGSL-3.2.2.1-220	The PGS shall be capable of ingesting and preprocessing, at full resolution, the common core instrument data extracted from the Metop global data, to NOAA Level 1 data sets.	PSYS-3.1.1-200	PIPS-3.3.3.1-010/020/030/040/070		D		
PGSL-3.2.2.1-221	The PGS shall be capable of ingesting and preprocessing the NOAA satellite blind orbit global data acquired from the Darmstadt Interface.	PSYS-3.1.1-140	PIPS-3.3.3.1-050/080		D		
PGSL-3.2.2.1-222	The PGS shall be capable of ingesting and preprocessing to NOAA Level 1 data set the MHS instrument data from the NOAA satellites global data.	PSYS-3.1.1-220	PIPS-3.3.3.1-050 PIPS-3.3.3.1-080		D		
PGSL-3.2.2.1-230	The PGS shall be capable of generating Level 2 and 3 products from the common core instrument data extracted from the Metop global data.	PSYS-3.1.1-215	PPGD-3.3.4.1-050/060/080		D		
PGSL-3.2.2.1-231	The PGS shall be capable of generating Level 2 and 3 products from the NOAA satellite blind orbit global data acquired from the Darmstadt Interface.	PSYS-3.1.1-140					
PGSL-3.2.2.1-235	The PGS shall be capable of generating Level 2 and 3 products from the MHS instrument data from the NOAA satellites global data.	PSYS-3.1.1-220	PPGD-3.3.4.1-080		D		
PGSL-3.2.2.1-240	The PGS shall be capable of ingesting and preprocessing to NOAA Level 1 data set any selectable instrument and telemetry data extracted from MHRPT data, received by the NOAA CDA stations.	PSYS-3.1.1-210	PIPS-3.3.3.1-060/090		D		
PGSL-3.2.2.1-245	The PGS shall be capable of generating Level 2 and 3 products for any selectable instrument and telemetry data extracted from MHRPT data.	PSYS-3.1.1-210	PPGD-3.3.4.1-020		D		
PGSL-3.2.2.1-250	The PGS shall be capable of ingesting and processing in pipeline mode, the Metop instrument Level 1 data, acquired from EPS, to meet NOAA user requirements.	PSYS-3.1.1-220	PIPS-3.3.3.1-100		D		
PGSL-3.2.2.1-260	The PGS shall be capable of generating Level 2 and 3 products from the Metop Level 1 data received from EPS, to meet NOAA user requirements.	PSYS-3.1.1-220	PPGD-3.3.4.1-030		D		

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PGSL-3.2.2.1-270	The PGS shall make available to users, the NOAA Level 1b data sets generated from the common instruments extracted from Metop global data, received from EPS.		PDAA-3.3.5.1-075 PDAA-3.3.5.2-010		D		
PGSL-3.2.2.1-280	The PGS shall make available to users, the NOAA Level 1b data sets generated from the Metop satellite global data.	PSYS-3.1.1-230	PDAA-3.3.5.1-070 PDAA-3.3.5.2-010		D		
PGSL-3.2.2.1-290	The PGS shall be capable of distributing all NOAA Level 2 and 3 products produced by the PGS, from the Metop satellite global/Level 1 data, to users.	PSYS-3.1.1-230	PPGD-3.3.4.1-100 PDAA-3.3.5.1-080 PDAA-3.3.5.1-090 PDAA-3.3.5.2-010 PPGD-3.3.4.2-040		D		
PGSL-3.2.2.1-295	The PGS shall be capable of distributing all NOAA Level 2 and 3 products produced by the PGS, from the common instruments extracted from Metop global data, to users	PSYS-3.1.1-230	PDAA-3.3.5.1-085				
PGSL-3.2.2.1-300	The PGS shall archive Metop global data/Level 1 data sets and associated databases received from the EPS.	PSYS-3.1.1-240	PCDAS-3.3.1.4-020 PDAA-3.3.5.1-010 PDAA-3.3.5.1-020 PDAA-3.3.5.1-030 PDAA-3.3.5.1-040 PDAA-3.3.5.1-060		D		
PGSL-3.2.2.1-305	The PGS shall archive common instruments Level 1 data sets and associated databases produced by the IPS element.	PSYS-3.1.1-215	PDAA-3.3.5.1-035		D		
PGSL-3.2.2.1-310	The PGS shall archive all supporting databases (ancillary, auxiliary, metadata, etc.) for Metop global /Level 1 data sets.	PSYS-3.1.1-240	PDAA-3.3.5.1-050 PDAA-3.3.5.4-010		D		
PGSL-3.2.2.1-320	The PGS shall archive all Levels 2 and 3 products generated by the PGS from: a) the common core instruments data on the Metop satellite b) the MHS instrument data c) the Metop instruments data on Metop satellite d) the selectable instrument data extracted from the MHRPT	PSYS-3.1.1-250	PDAA-3.3.5.1-040 PDAA-3.3.5.1-060 PDAA-3.3.5.4-010		D		
PGSL-3.2.2.1-330	The PGS shall provide for telecommunications capabilities among the PGS elements to exchange satellite data and information, reliably and in a timely manner as defined by each of the interconnecting element.	PSYS-3.1.1-020 PSYS-3.1.1-260	PCOM-3.3.6.1-020 PCOM-3.3.6.1-040 PCOM-3.3.6.3-010		D		

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PGSL-3.2.2.1-340	The PGS shall provide for telecommunications capabilities between the Suitland and Darmstadt Interfaces, for acquiring from Darmstadt the following data types. [PSYS-3.1.1-020, PSYS-3.1.1-270] <ul style="list-style-type: none"> <li>a) NOAA GAC/SAIP/STIP in pipeline mode</li> <li>b) Metop global data in pipeline mode</li> <li>c) NOAA TIP/AIP/HRPT in throughput mode</li> <li>d) NOAA TC Echo in throughput mode</li> <li>e) Metop instruments Level 1 data sets</li> <li>f) Cross-support and operational planning data</li> </ul>	PSYS-3.1.1-020 PSYS-3.1.1-270	PCOM-3.3.6.1-050 PCOM-3.3.6.3-020 PCOM-3.3.6.4-040		D		
PGSL-3.2.2.1-350	The PGS shall provide for telecommunications capabilities between the Suitland and Darmstadt Interfaces, for transporting to Darmstadt the following data types: [PSYS-3.1.1-020, PSYS-3.1.1-270] <ul style="list-style-type: none"> <li>(a) NOAA satellite telecommand for NOAA blind orbits and contingency operations in throughput mode</li> <li>(b) MHS instrument and telemetry data</li> </ul>	PSYS-3.1.1-020 PSYS-3.1.1-270	PCOM-3.3.6.1-050 PCOM-3.3.6.3-020 PCOM-3.3.6.4-040		D		
PGSL-3.2.2.1-360	The PGS shall provide telecommunications capabilities among the PGS elements and maintain existing external interfaces including DOD in the IJPS period.	PSYS-3.1.1-020/260	PCOM-3.3.6.1-070 PCOM-3.3.6.2-070 PPGD-3.3.4.3-010 PPGD-3.3.4.3-020 PPGD-3.3.4.3-030 PDAA-3.3.5.3-010 PDAA-3.3.5.3-020		D		
PGSL-3.2.2.1-370	The PGS shall provide instrument calibration databases for both the NOAA and Metop satellites to support product generation needs in the IJPS period.	PSYS-3.1.1-280	PIPS-3.3.3.1-055		D		
PGSL-3.2.2.1-380	The PGS shall integrate into the PGS any unique EUMESAT provided equipment required to perform commanding, telemetry acquisition and/or data handling of operational Metop satellites.	PSYS-3.1.3-010	PCDAS-3.3.1.1-150		D		
PGSL-3.2.2.1-390	The PGS shall be capable of recording, playing back, and transferring to the Suitland Interface the NOAA satellite STIP, SAIP, and GAC data.	PSYS-3.1.1-110	PCDAS-3.3.1.1-130		D		
PGSL-3.2.2.1-400	The PGS shall be capable of recording, playing back, and transferring to the Suitland Interface the GDS data received from Metop satellites.	PSYS-3.1.1-130	PCDAS-3.3.1.1-140		D		

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
	<b><u>3.2.2.2 Operational</u></b>						
PGSL-3.2.2.2-010	The PGS shall be capable of supporting IJPS operations upon the successful completion of the System Commissioning Review (SCR) for Metop satellites and On-orbit Verification Review for NOAA satellites.	PSYS-3.1.2-010	PCDAS-3.3.1.2-010 PSOC-3.3.2.2-010 PIPS-3.3.3.2-010 PPGD-3.3.4.2-010		D		
PGSL-3.2.2.2-020	The PGS shall provide for a rolling archive of 7 days for the NOAA-N and -N' and Metop global data acquired at the CDA stations.	PSYS-3.1.2-030	PCDAS-3.3.1.4-020		D		
PGSL-3.2.2.2-030	The PGS shall conduct day-to-day operations of NOAA satellites in coordination with the EPS ground segment and support joint tasks, including the cross-support and blind orbit support tasks.	PSYS-3.1.2-020	PCDAS-3.3.1.2-020 PSOC-3.3.2.2-020/030 PIPS-3.3.3.2-020 PPGD-3.3.4.2-030		D		
PGSL-3.2.2.2-040	The PGS shall provide for Metop telecommand and telemetry data transporting operations, in a throughput mode, for cross-support of operations in compliance with performance requirements as per 3.2.2.4.	PSYS-3.1.1-270	PCOM-3.3.6.1-060 PSOC-3.3.2.1-030 PSOC-3.3.2.1-40		D		
PGSL-3.2.2.2-050	The PGS shall transfer NOAA satellite telecommand to the Darmstadt Interface for NOAA blind orbits.	PSYS-3.1.1-260 PSYS-3.1.2-040	PSOC-3.3.2.2-060		D		
PGSL-3.2.2.2-060	In the event of GAC data acquisition failure by EPS at the Suitland Interface, the PGS shall make available the backlog GAC or SAIP or STIP data at the Suitland Interface again, or on tapes as requested by the EPS.	PSYS-3.1.1-110	PCDAS-3.3.1.2-030 PSOC-3.3.2.2-070/080 PCOM-3.3.6.2-020		D		
PGSL-3.2.2.2-070	In the event of GDS data acquisition failure by EPS at the Suitland Interface, the PGS shall make available the backlog GDS data again, or on tapes as requested by the EPS.	PSYS-3.1.1-130	PCDAS-3.3.1.2-040 PCOM-3.3.6.2-020		D		
PGSL-3.2.2.2-080	The PGS shall support the execution of detailed joint plans and procedures with EPS for supporting nominal, contingency and split-mission scenario operations.	PSYS-3.1.2-040	PSOC-3.3.2.2-040 PCOM-3.3.6.2-020		A		
	<b><u>3.2.2.3 Interface</u></b>						
PGSL-3.2.2.3-010	The PGS shall be capable of interfacing with the EPS Metop satellites for telemetry and data (downlink) and telecommand (uplink), as defined in AD-5.	PSYS-3.1.3-010	PCDAS-3.3.1.3-010/030		D		

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PGSL-3.2.2.3-020	The PGS shall provide for a single point Interface at Suitland, known as the Suitland Interface, in support of data exchange, cross support activities and telecommand operations in compliance with performance requirements in Section 3.2.2.4.	PSYS-3.1.3-030	PSOC-3.3.2.3-010 PIPS-3.3.3.3-010 PCOM-3.3.6.1-050		D		
PGSL-3.2.2.3-021	The PGS shall exchange auxiliary and co-ordination data with the EPS via a "Generic File Transfer (GFT)" interface.	PSYS-3.1.1-180 PSYS-3.1.3-040	PSOC-3.3.2.3-020 PIPS-3.3.3.3-020		D		
PGSL-3.2.2.3-025	The PGS shall provide a voice loop for exchange of operational coordination with the EPS ground segment.	PSYS-3.1.3-035	PSOC-3.3.2.3-030		D		
PGSL-3.2.2.3-030	The PGS shall make available to EPS ground segment at the Suitland Interface, the following data types, in compliance with the performance requirements. (a) NOAA GAC data from NOAA-N and -N' acquired by the NOAA CDA station. (If GAC is unavailable, then Stored AIP (SAIP) or Stored TIP (STIP) data.) In case of communications failure, between NOAA and EPS ground segment, PGS shall provide the backlog GAC or SAIP or STIP data on a tape (Standard TBD). (b) Metop GDS data acquired by the NOAA CDA station for EPS blind orbits. In case of communications failure between NOAA and EPS ground segment, PGS shall provide the backlog data on a tape (Standard TBD). (c) Metop telemetry data acquired by the NOAA CDA station for EPS blind orbits. (d) NOAA satellite and instruments auxiliary and coordination data. (e) Metop telecommand echo upon successful transmission of the EPS generated satellite command, by the PGS CDA station.	PSYS-3.1.1-110	PCDAS-3.3.1.3-040 PSOC-3.3.2.2-040		D		

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PGSL-3.2.2.3-031	The PGS shall provide the following backlog data tapes (Standard TBD) as appropriate to EPS, in the event of communications failure between NOAA and EPS: (a) Backlog GAC or SAIP or STIP data (b) Backlog GDS	[PSYS-3.1.1-110, PSYS-3.1.1-130]			A		
PGSL-3.2.2.3-035	The PGS shall provide a data buffering capacity at the Suitland Interface, for data acquired from Fairbanks CDA, to contain a minimum of one complete download of NOAA GAC or SAIP or STIP and one complete download of GDS data, at all times.	PSYS-3.1.3-030	PSOC-3.3.2.2-050 PSOC-3.3.2.1-220		D		
PGSL-3.2.2.3-040	The PGS shall be capable of receiving at the Suitland Interface the Metop telecommand data delivered by EPS ground segment, and transfer it to the Fairbanks CDA station in compliance with performance requirements, Section 3.2.2.4.	PSYS-3.1.3-030	PCDAS-3.3.1.4-100 PSOC-3.3.2.2-040 PSOC-3.3.2.4-070		D		
PGSL-3.2.2.3-050	The PGS shall be operationally compatible to exchange data/information with the Darmstadt Interface at the EPS ground segment.	PSYS-3.1.3-040	PCOM-3.3.6.1-050 PCOM-3.3.6.1-060 PCOM-3.3.6.1-070		D		
PGSL-3.2.2.3-060	The PGS shall acquire from the Darmstadt Interface the following data types, made available by the EPS: (a) GAC data from NOAA-N and N' satellites received by the EPS PCDA station. (If GAC is unavailable, then Stored AIP (SAIP) or Stored TIP (STIP) data.) (b) Metop GDS data acquired by the EPS PCDA station. (c) NOAA TIP/AIP/HRPT real time data acquired by the EPS PCDAS station (d) Metop instrument Level 1 data sets made available by EPS. (e) Metop satellite and instruments auxiliary and coordination data as defined in AD-4. (f) NOAA telecommand echo upon successful transmission of the NOAA generated satellite command, by the EPS CDA station.	PSYS-3.1.1-050, PSYS-3.1.1-140, PSYS-3.1.1-105, PSYS-3.1.3-040	PIPS-3.3.3.2-030		D		



Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PGSL-3.2.2.3-061	The PGS shall acquire the following backlog data tapes (Standard TBD) as appropriate from EPS, in the event of communications failure between NOAA and EPS: (a) Backlog GAC or SAIP or STIP data (b) Backlog Metop GDS data	PSYS-3.1.1-110, PSYS-3.1.1-130			A		
PGSL-3.2.2.3-065	The PGS shall provide a data buffering capacity, for data acquired from Darmstadt Interface, to contain a minimum of one complete download of NOAA GAC or SAIP or STIP data and one complete download of GDS data, at all times.	PSYS-3.1.3-030	PSOC-3.3.2.2-050 PCOM-3.3.6.3-040		D		
PGSL-3.2.2.3-070	The PGS shall be capable of delivering to the Darmstadt Interface the NOAA telecommand for uplink to the NOAA satellite through the EPS ground segment.	PSYS-3.1.1-090	PSOC-3.3.2.1-130		D		
PGSL-3.2.2.3-080	The PGS shall interface with the EPS for the reception of decryption keys for Metop LRPT/HRPT.	PSYS-3.1.3-040	PSOC-3.3.2.2-040 PSOC-3.3.2.2-060		D		
PGSL-3.2.2.3-090	The PGS shall provide/maintain an interface for NOAA user community to access and retrieve short-term and long-term stored/archived data/products from both NOAA and Metop satellites in the IJPS period.	PSYS-3.1.3-050	PDAA-3.3.5.3-030		D		
PGSL-3.2.2.3-100	The PGS shall provide/maintain an interface for the distribution of the NOAA global data, to users and the Department of Defense in the IJPS period.	PSYS-3.1.3-050	PCOM-3.3.6.1-080		D		
PGSL-3.2.2.3-110	The PGS shall provide/maintain an interface for the distribution of the common core instrument data extracted from Metop global data, to users and the Department of Defense in the IJPS period.	PSYS-3.1.3-060	PCOM-3.3.6.1-080		D		
PGSL-3.2.2.3-120	The PGS shall be capable of interfacing with any unique EPS provided equipment required for performing commanding, telemetry acquisition or data handling for Metop satellites.	PSYS-3.1.3-010	PCDAS-3.3.1.3-020		D		
	<b><u>3.2.2.4 Performance</u></b>						
PGSL-3.2.2.4-010	The PGS shall be capable of supporting the launch of a new POES within 120 days of notification.	PSYS-3.1.4-010	PCDAS-3.3.1.4-010 PSOC-3.3.2.4-010		A		
PGSL-3.2.2.4-020	The PGS shall provide for an overall system availability of at least 97.5% calculated on an annualized basis.	PSYS-3.1.4-020	PCDAS-3.3.1.4-030		A		

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PGSL-3.2.2.4-030	The PGS shall provide the NOAA GAC or SAIP or STIP data at the Suitland Interface as defined below: (a) In a time ordered manner (first data in transmitted first) (b) As received with out any processing (c) First data no later than 2 minutes after loss of signal (d) Last data no later than 100 minutes after download completion (e) Data available in a pipeline mode	PSYS-3.1.4-020	PCDAS-3.3.1.4-040/090 PSOC-3.3.2.4-040/050 PCOM-3.3.6.4-010/020		T		
PGSL-3.2.2.4-040	The PGS shall provide the Metop blind orbit global data at the Suitland Interface as defined below: (a) In a time ordered manner (first data in is transmitted first) (b) Reed-Solomon error decoded and quality flag appended (c) Data in the VCDU format (d) UTC time stamp appended (e) First data no later than 2 minutes after download completion (f) Last data no later than 100 minutes after download completion (g) Data available in a pipeline mode.	PSYS-3.1.4-020	PSOC-3.3.2.1-090 PCDAS-3.3.1.1-060 PCDAS-3.3.1.1-030		T		
PGSL-3.2.2.4-050	The PGS shall deliver 98.8% of the NOAA GAC or SAIP or STIP data acquired to the Suitland Interface, measured over any 30-day period.	PSYS-3.1.4-020	PCDAS-3.3.1.4-090 PCOM-3.3.6.4-010		A		
PGSL-3.2.2.4-060	The PGS shall deliver 98.8% the Metop global data acquired to the Suitland Interface, measured over any 30-day period.	PSYS-3.1.4-020	PCDAS-3.3.1.4-070 PCDAS-3.3.1.4-080 PCOM-3.3.6.4-010		A		

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Level & Method			Rationale / Comments
				Ele.	PGS/ POES	IJPS	
PGSL-3.2.2.4-070	The PGS shall deliver the Metop blind orbit telemetry (TM) data to the Suitland Interface as defined below: (a) Data available in a throughput mode (b) UTC time stamp appended, with accuracy better than 100 micro-secs. (TBC) and format to conform to the EPS Product Conventions Document [EPS/SYS/TEN/990007] (c) NOAA shall not alter the content of the TM frames (d) Ensure that 98.8% of TM Downlink successfully transferred over a 30-day period (e) The delay between the TM Frame complete acquisition and its availability at the interface shall be less than 1 second (f) Maximum downtime of the TM transport chain between the CDA station and the interface shall not exceed 100 minutes (g) Interface shall be compatible with EPS CGS common TM/TC interface standard (TBD).	PSYS-3.1.4-020	PCDAS-3.3.1.4-070 PSOC-3.3.2.4-060		T		
PGSL-3.2.2.4-080	The PGS shall not exceed a 360 minutes maximum downtime limit for the NOAA CDA station to the Suitland Interface data delivery chain in a 30-day period.	PSYS-3.1.4-020	PCDAS-3.3.1.4-050 PSOC-3.3.2.4-020 PCOM-3.3.6.4-030		A		
PGSL-3.2.2.4-090	The PGS maximum command transport chain downtime from the Suitland Interface to the CDA station shall not exceed 100 minutes in a 30-day period.	PSYS-3.1.4-020	PCDAS-3.3.1.4-060 PSOC-3.3.2.4-030		A, T		
PGSL-3.2.2.4-100	The PGS shall be capable of delivering to the Darmstadt Interface, the MHS telemetry data extracted from NOAA satellites global data, via the communication element as defined below. (a) Transfer in throughput mode (b) Data format as extracted from the satellite data.	PSYS-3.1.4-020	PSOC-3.3.2.1-180 PSOC-3.3.2.1-190		D		
PGSL-3.2.2.4-110	The PGS shall complete product processing of any selectable instrument and telemetry data extracted from MHRPT received at a PGS CDA station, and deliver products to users in less than 30 minutes from observation.	PSYS-3.1.4-030	PCDAS-3.3.1.1-025 PCDAS-3.3.1.1-030 PCOM-3.3.6.1-010 PIPS-3.3.3.1-060 PPGD-3.3.4.1-020		A		

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